THE HEATING AND VENTILATING MAGAZINE

VOL. VI., NO 4 NEW YORK, APRIL, 1909 $1 00 a year, 10 cents a copy

GURNEY HEATERS

FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER

THEY GIVE ENTIRE SATISFACTION SEND FOR CATALOGUE.

GURNEY HEATER MANUFACTURING CO.

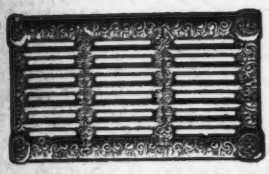
NEW YORK OFFICE 12 E 42ND ST. 188-200 FRANKLIN ST. BOSTON.

KIELEY

Reducing Valves and Steam Traps for all services; Damper Regulators, Back Pressure and Relief Valves. Grease Extractors and Steam Separators. Pump Governors Pump Regulators, Float Valves, Water Arches, Hot Water Temperature Controllers, Water Feeders, etc.

Kieley & Mueller
34 West 13th Street
New York City. N. Y.

Steam Specialties



FOWLER & WOLFE MANUFACTURING CO.

ORIGINATORS OF WALL RADIATION

Bourse Building, Philadelphia, Pa

WE GUARANTEE OUR WALL RADIATION:

To contain the rated surfaces.
To have been tested at 100 lbs. pressure before shipment.
To provide for perfect circulation when installed in either vertical or horizontal form.

We challenge any other manufacturers of wall radiation to equal the above guarantee.

KINNEAR PRESSED RADIATORS

For STEAM and HOT WATER

LIGHT. COMPACT. DURABLE AND QUICK ACTING

Write for Catalogue and Literature

THE PRESSED RADIATOR CO. OF AMERICA, PITTSBURGH, PA.

THE COVERING AND SUPPLY CO.

Manufacturers, Dealers and Contractors in

ASBESTOS MATERIALS

STEAM PIPE AND BOILER COVERINGS
OF EVERY DESCRIPTION

OFFICE and WAREROOMS
232 WEST ST., NEW YORK

STANDARD TEMPERATURE REGULATION CO.

WEST STREET BUILDING, WEST AND CEDAR STS., NEW YORK

AUTOMATIC HEAT REGULATION

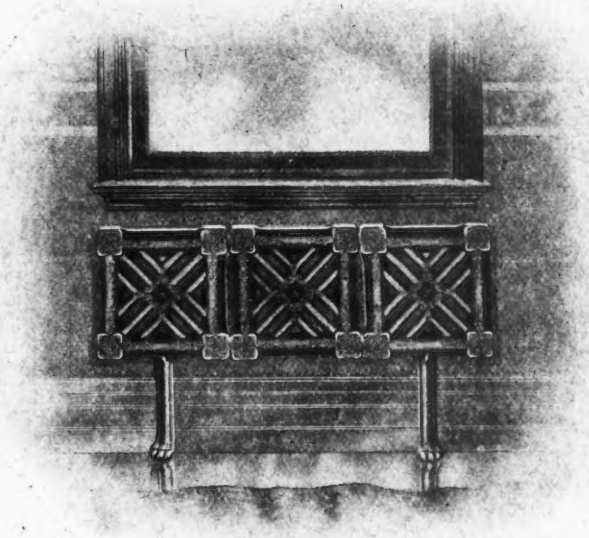
Entered as second-class matter at the Post-Office in New York, N. Y.

Copyright, 1909, by A. S. Armagnac

CROSBY Spring Seat Globe and Angle VALVES All parts Interchangeable. All Parts Removable Tested for Highest Pressures LEAK-PROOF

CROSBY STEAM GAGE & VALVE CO. Boston New York Chicago

X-RAY
WALL RADIATOR



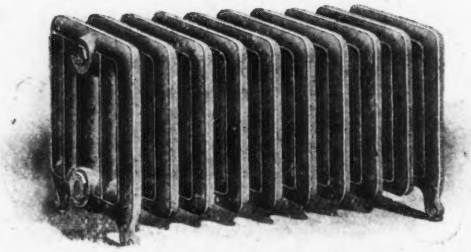
Made in 5-foot and
8-foot Sections

THE H. B. SMITH CO.
Westfield, Mass.

728 Arch St.
PHILADELPHIA

39 East Houston St.
NEW YORK

138 Washington St. No.
BOSTON



FIVE COLUMN PRINCESS
WINDOW RADIATOR
12, 14 and 16 inches High

PACIFIC COAST AGENTS
Holbrook, Merrill
and Stetson
LOS ANGELES and
OAKLAND, CAL.

EUROPEAN AGENTS
August Eggers
BREMEN and NEW YORK

Pipe, Fittings, Valves and Engineering Specialties

Automatic Air Valves

TRADE (S) MARK

Double Connection
Circulating
Syphon Action

A Guaranteed Valve

No. 1. Price, $1.15
Side Outlet, with Cap

No. 6. Price, $1.35
Side Outlet—Lock Shield

No. 3. Price, $1.15
Bottom Outlet, ⅜ or ¼ inch

These valves are the best made in every respect. Small holes and tubes are avoided, to prevent clogging. Being fitted with Double passages into the Radiator, all danger of throwing water and water clogging is eliminated. The Expansion post is made of an indestructible, highly sensitive compound, insuring quick action. The Workmanship is perfect, the Plating extra heavy and every valve tested and guaranteed for five years.

JOHN SIMMONS CO.

OFFICES AND SALESROOMS
110 Centre Street, New York

When writing mention Department E

MACHINE SHOP	FACTORIES AND SHOPS	DOCK
48 to 58 Baxter St., N. Y.	*155-161 Leonard St.,* *5-7 Franklin St., N. Y.*	*381 South St., N. Y.*

FOUNDRY AND PIPE BENDING SHOP
Newark, N. J.

NEW YORK HEATING AND VENTILATION SCHOOL

Steam, Hot Blast — **Hot Water**

TO THE DRAUGHTSMAN:

Place yourself in a position to legitimately demand more salary, by enrolling with us. Draughtsmen now receiving $12.00 to $35.00 per week CAN and WILL be able to hold down positions paying from $25.00 to $50.00 per week. The complete course can be paid for in one to three months' salary increase, according to the adaptability of the student.

TO THE SALESMAN:

You should be posted in ALL branches of Heating and Ventilation, so that you can not only explain thoroughly and protect "Your System," but be in a position to diagnose the "Other Fellow's System." It usually takes more than mere TALK to sell a plant.

TO THE OPERATING ENGINEER:

You should be as familiar with the Method by which your plant was designed as you are familiar with the plant itself. Are you sure that this boiler, or that pipe, or these ducts are carrying their full capacity, and that you cannot add a load of 10 HP., or 500 sq. ft. of radiation, or 10,000 cu. ft. of air per min. to your plant without affecting the present equilibrium of same? We can give you some simple methods of finding out, and at a very little expense to you.

TO THE COLLEGE GRADUATE Who Desires to Take Up Heating and Ventilation as a Profession:

You can receive in our course, in a few weeks' time, information and methods which have taken years of experience on the part of the Originators to accumulate. It is more satisfactory to receive at the start of your Business Career $25.00 to $35.00 than $12.00 to $15.00 per week.

We teach the Student how to design all Types of Steam, Hot Blast and Hot Water Plants. We do not Drag the Lessons out or Pad the Instruction Sheets. We take it for granted that the Student already knows what a Boiler Is and Would Recognize a Radiator if he Saw one. We are not borrowing electro plates from manufacturers to fill up space, neither are we copying specification reports or claims issued by the different systems. But we are giving you, as near as Three Experienced Heating and Ventilating Engineers can, unbiased facts relative to the different systems on the market to-day, together with formulas as simple as rules of Thumb, but far more satisfactory.

You will be surprised at the condensed information received in the First Lesson.

We Speak from Experience
We Have Been Through It

The New York Heating and Ventilation School
Lock Box 62
Madison Square New York

Fill in and Mail Us This Coupon to Us To-Day.

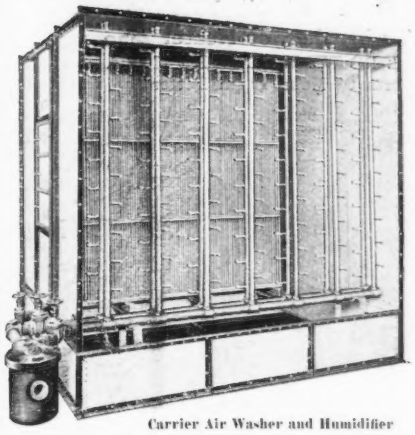
New York H. & V. School.
Box 62, Madison Square, N. Y.
Gentlemen:—Please send me full information regarding course in HEATING AND VENTILATION as taught by the New York H. & V. School.

Name.....

Address.....

H. Apr. '09.

THE CARRIER AIR WASHER AND HUMIDIFIER



Carrier Air Washer and Humidifier

Thoroughly washes all air passing through it, removing all solid particles of dust and soot.

Removes all free moisture held in suspension as a result of washing process.

Maintains automatically any desired humidity in the building accurately by thermostatic control.

Supplies automatically and instantaneously the exact quantity of steam required for evaporation of moisture governed by the requirements of the thermostat.

Does over one-half the tempering of air, thus eliminating the usual heating coil in front of the washer with great gain in efficiency.

Cools air passing through it in summer without the use of cold water.

CARRIER AIR CONDITIONING CO. OF AMERICA

(123-C) **39 CORTLANDT STREET, NEW YORK**

OF AMERICA

CHICAGO **NEW YORK**

VANAUKEN

SYSTEM OF VACUUM HEATING

AND THE

BELVAC THERMOFIER

Referred to on page 39 and 40 of this issue are fully described in our new 96-Page Catalogue, to be had for the asking.

Hundreds of users attest the merit of Our Devices which include also a full line of

STEAM HEATING SPECIALTIES

CONSOLIDATED ENGINEERING COMPANY

Main Office and Factory, Canal and Jackson Sts., Chicago, Ill.

PITTSBURG—WASHINGTON—INDIANAPOLIS—ST. PAUL.

GARDEN CITY FANS

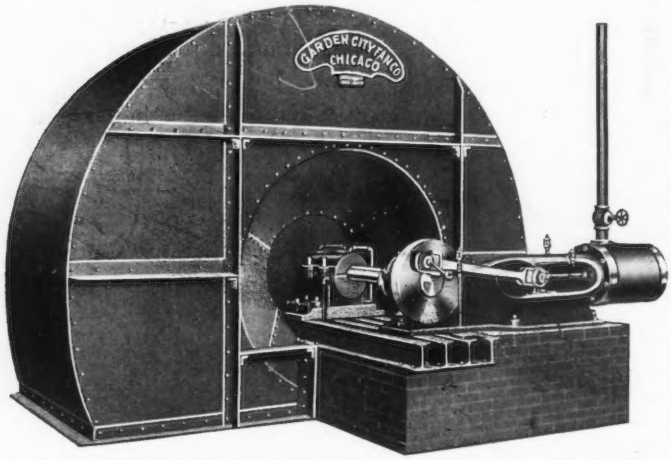
THE NAME IS A GUARANTEE OF QUALITY. LET US REMOVE YOUR TROUBLES.

Everything in the Fan, Blower, Air Washer, or Heater Line

570 PATTERNS, IF NONE OF THESE WILL DO WE WILL MAKE MORE.

"Good Goods and Never Ceasing Efforts to Make Them Better"

ONE OF THE 570



WHY NOT TRY?

ASK FOR CATALOG

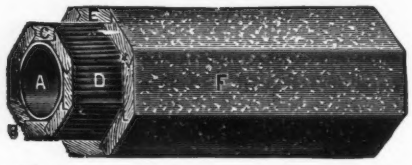
GARDEN CITY FAN CO. FISHER BUILDING CHICAGO, ILL.

SINGER BLDG., NEW YORK CITY. CHEMICAL BLDG., ST. LOUIS, MO. LUMBER EXCHANGE BLDG., MINNEAPOLIS, MINN.

Wyckoff Patent Steam Pipe Covering

It is the best made for underground or exposed pipes, because—

(A) It is made with tin next to the pipe, then with a layer of asbestos paper, then layer of pine, so arranged as to furnish an air space between, then corrugated insulating paper, then another layer of pine, giving another air space, all covered with special preparation of asphaltum pitch.



A—Tin Lining. B—Asbestos. C—Wood. D—Corrugated Paper. E—Wood. F—Asphaltum Coating.

(B) It is waterproof.

(C) It is easily put on and easily removed. (D) Experience shows that it saves more steam than any other covering.

It Is Time to Order Now for the Season
References and Prices on Request

A. WYCKOFF & SON CO., "Box A" Elmira, N. Y.

The Heating and Ventilating Magazine

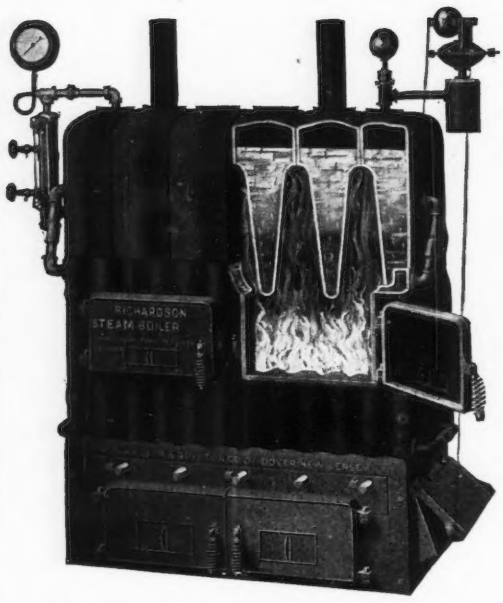
VOL. VI No. 4

Contents for April, 1909

A Heating, Ventilating and Humidifying System for a Country Residence - - - - - - - 1
Leakage of Air Around Windows - - - - - - 7
Discussion
The Rating of House Heating Boilers - - - - - 9
Report of Committee, American Society of Heating and Ventilating Engineers
Ventilation of a Banking Room or Separate Office - - *Charles L. Hubbard* 12
Tests of Steam Heating Apparatus - - - - - - 15
1. Cast Iron House Heating Boilers
2. Automatic Steam Pump and Receiver
Design of Furnace Heating Systems. II. *Prof. J. D. Hoffman* 18
Practical Requirements of New York State Ventilation Law 23
Testing and Performance of Steam Generating Apparatus *A. Bement* 25
Ventilation of New Pennsylvania Railroad Passenger Cars 28
State Control of Heating and Ventilating Engineers - 29
Correspondence - - - - - - - - - - 30
Standard Rating for House Heating Boilers
Current Heating and Ventilating Literature - - - 31
The Weather for March - - - - - - - - 32
New York, Boston, Chicago, Pittsburg, and St. Louis

YEARLY SUBSCRIPTION, $1.00 **SINGLE COPIES, 10 CENTS**

Published monthly by the Heating and Ventilating Magazine Co., 1123 Broadway, New York.



RICHARDSON

Sectional and Round

BOILERS

for

Steam & Water

Many Thousands in Use

RICHARDSON & BOYNTON CO.

CHICAGO - - NEW YORK - - BOSTON

THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK APRIL, 1909

A Heating, Ventilating and Humidifying System for a Medium-sized Country Residence

Given an owner who has well defined ideas of the kind of heating and ventilation required in his home and an engineer competent to fulfill those requirements, the result is very likely to be a highly modern and efficient plant. Such a result has been achieved in the three story and basement residence of Mr. Charles Cluthe, Sr., on Ridgewood Ave., Glen Ridge, N. J. The house is a new one and has been occupied but one winter. The operation of the system during that period, however, has been carefully observed and has not only met the expectations of the designer, but has shown a surprising economy in the consumption of fuel. Although the winter was a comparatively mild one in that section, the coal consumption totaled less than 10½ tons up to the 1st of April.

The arrangement consists of a combination of two heating systems, direct hot water and indirect hot water. It is a two-pipe gravity system operated by a Bernhard boiler

RESIDENCE OF CHARLES CLUTHE, GLEN RIDGE, N. J.

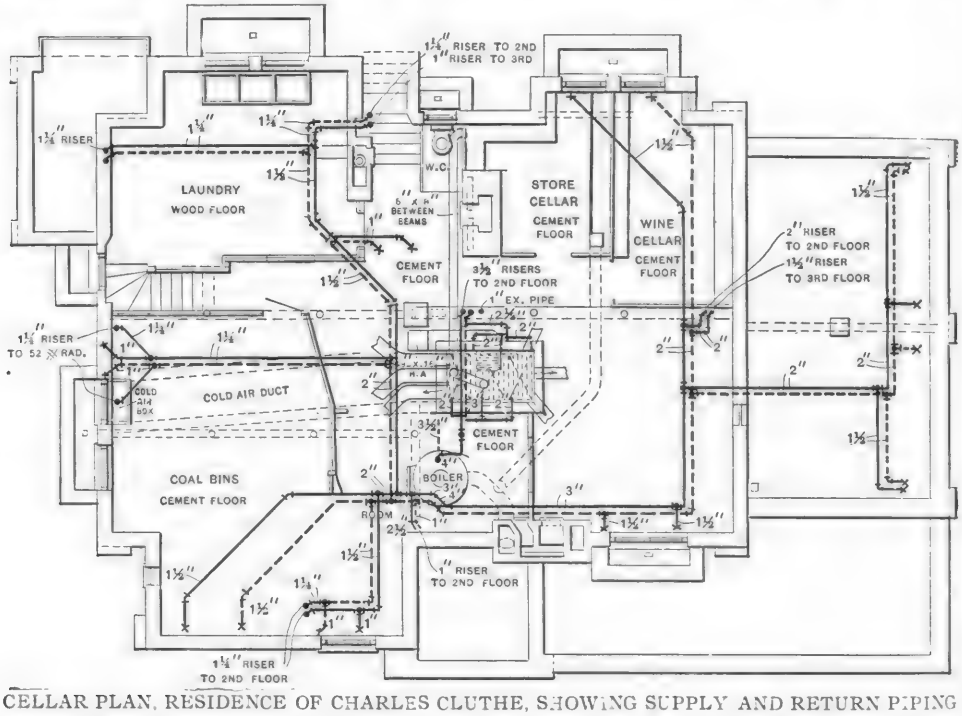
having a rated capacity of 2,475 sq. ft.

The warm air supply is provided by a heating chamber located in the center of the basement in which heating stacks are located. Ducts lead from this chamber to various points in the basement, where they connect with risers leading to the rooms to be ventilated.

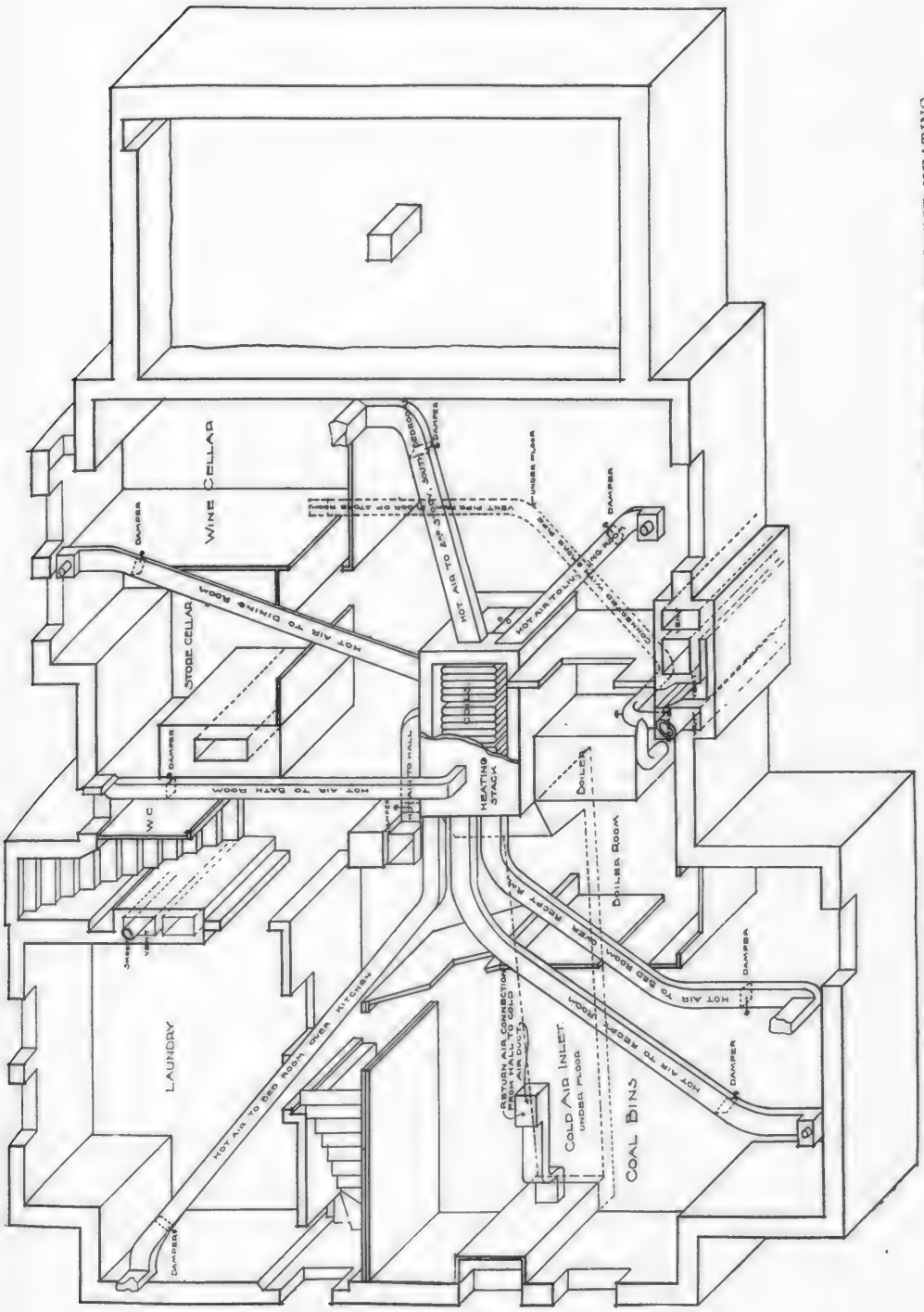
A 4-in. supply pipe leaves the heater, and at the point shown on the drawing the pipe is reduced to 3½ in., and is carried up and run between the first floor beams to the rising point shown on the basement plan. The riser runs to the second floor, where it is connected to a tee, 3½ in. x 1 in. x 3½ in., the 1 in. outlet looking upward from the remaining 3½ in. outlet. The piping is run 3½ in. back to the cellar, where the necessary connections are made for the supply to the separate six stacks in the heating chamber. The supply to each stack is run from a 3½-in. headed main of 2-in. pipe direct to stack openings.

From the 1-in. outlet, above described, a 1-in. pipe is run between floor beams on the second floor and up in partition to the third floor, where it is connected to a 42-gal. expansion tank. At this point there is a 1-in. stop cock which, in the operation of the system, is opened one-quarter inch to release the air from the heating stacks. The expansion pipe connected to the bottom of the tank is 1-in. It is brought into the cellar and connected separately to the bottom of the heater. The overflow pipe from top of tank is 1½-in. and is carried through the roof and provided with a 1½-in. return bend on top of same.

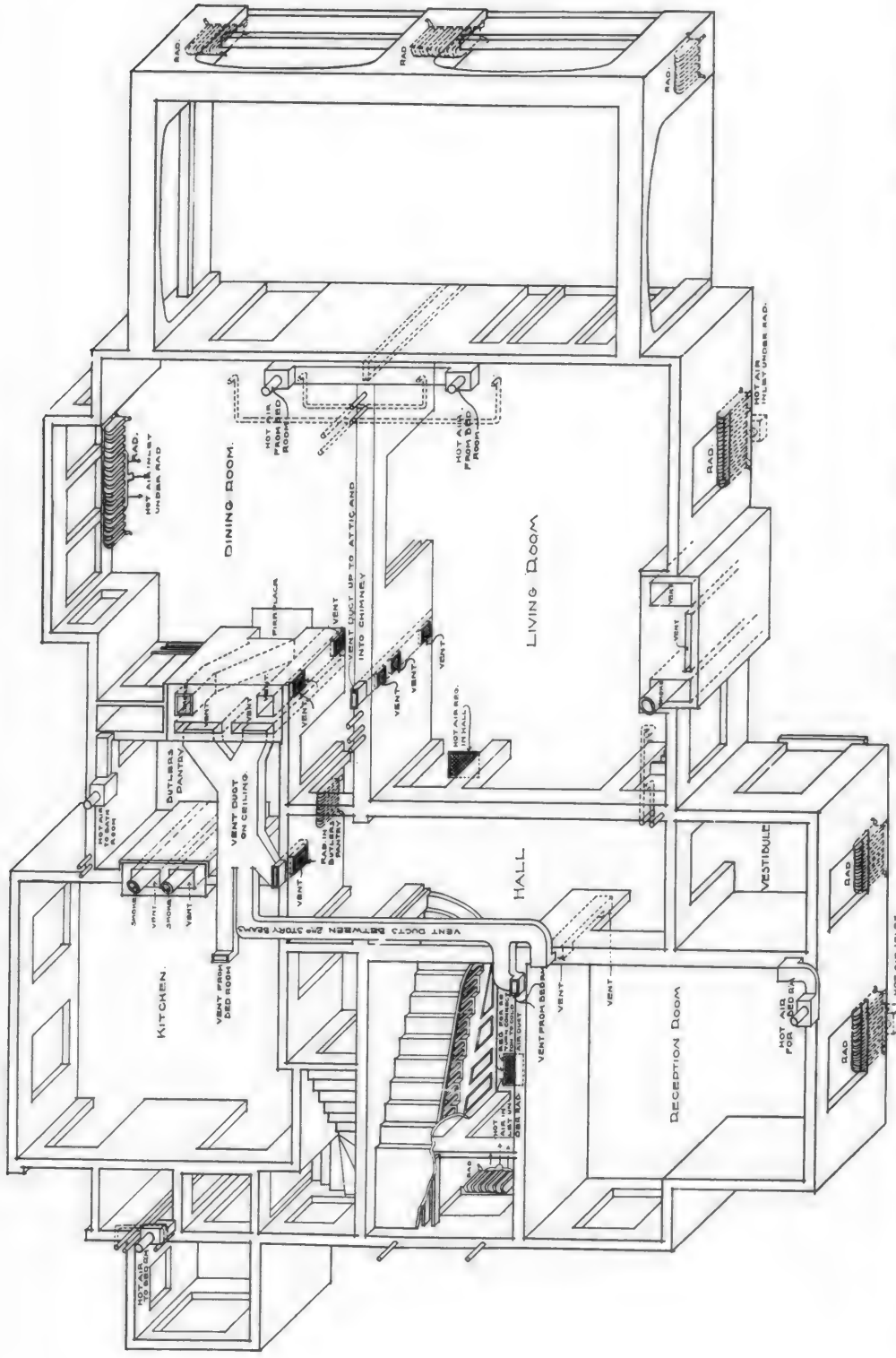
The central heating stack chamber is built of 8-in. brick and is large enough to accommodate 600 sq. ft. of indirect radiation, arranged in six separate stacks of sanitary school pin indirect radiators made by the American Radiator Co. The lower tier of stacks are so set as to permit of 6-in. space between them. The chamber has a galvanized iron door for access to the stacks. It is made in two sheets, with a 2-in. space between, packed with mineral wool. In order to give an equal distribution of air through the stacks, three galvanized iron louvres are provided, lapping each other and extending the full width of the stack. They have rounded edges, as shown



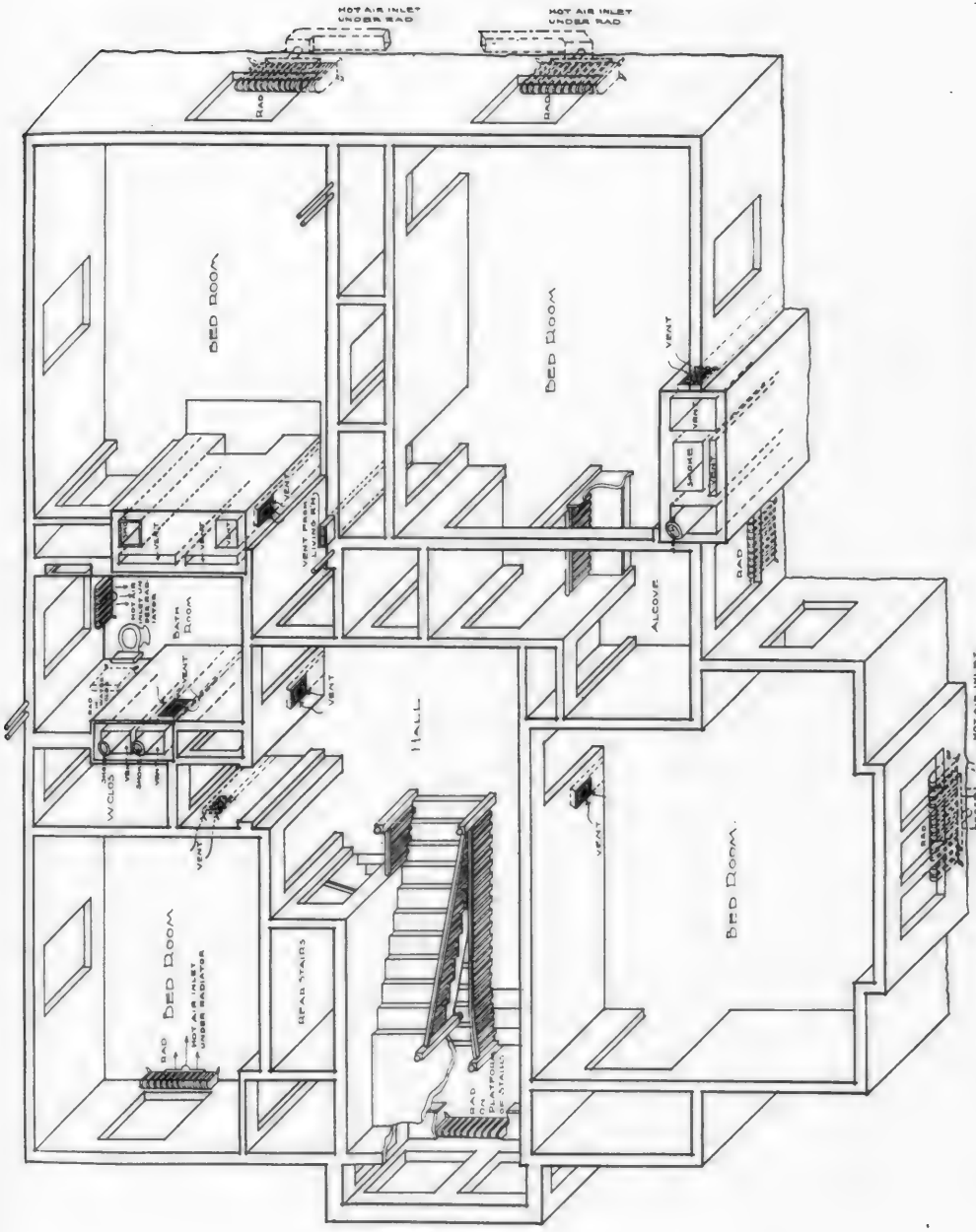
CELLAR PLAN, RESIDENCE OF CHARLES CLUTHE, SHOWING SUPPLY AND RETURN PIPING



CELLAR PLAN, RESIDENCE OF CHARLES CLUTHE, GLEN RIDGE, N. J., SHOWING SCHEME OF INDIRECT HEATING



FIRST FLOOR PLAN, RESIDENCE OF CHARLES CLUTHE, GLEN RIDGE, N. J. NOTE THE THREE VENT REGISTERS AT DIFFERENT HEIGHTS IN LIVING ROOM. UPPER VENT REGISTER IS DESIGNED FOR USE IN SUMMER ONLY FOR COOLING PURPOSES



SECOND FLOOR PLAN, RESIDENCE OF CHARLES CLUTHE, GLEN RIDGE, N. J.

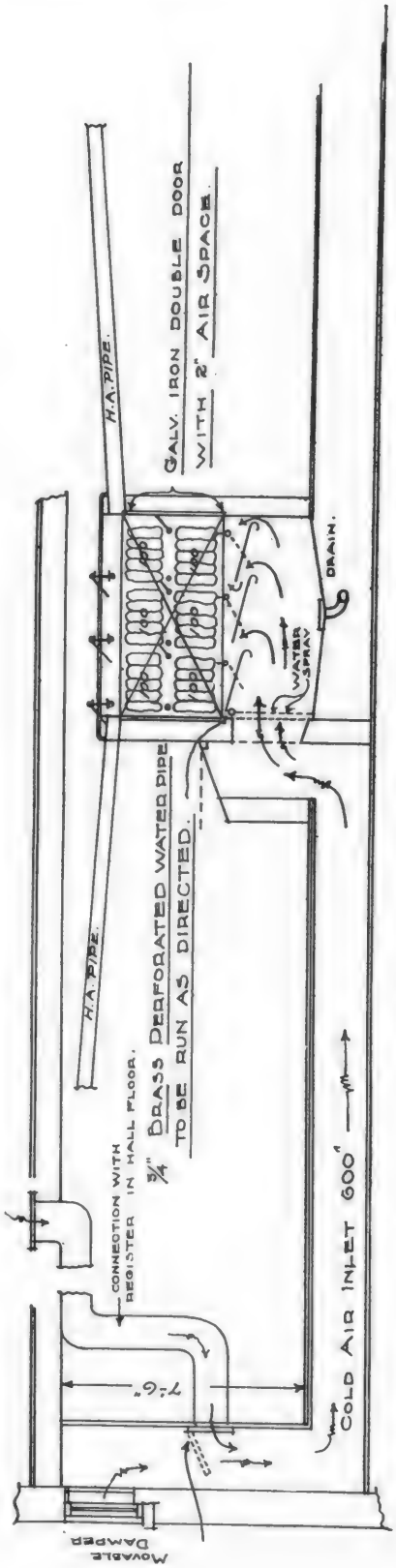
in the sectional view of the heating chamber.

Fresh air is brought in through a cellar window of an area of 600 sq. in., and carried through an underground cold air chamber of brick. The opening is provided with a pivoted swinging damper arranged to be locked at any angle. There is provision for recirculating the air in the house by closing the damper entirely and opening a register in the first floor hall, 14 in. x 16 in. Provision is also made for the placing of an 18-in. fan to be used in connection with the gravity system.

The total amount of direct and indirect radiation distributed throughout the house is 1,381 sq. ft., of which 600 sq. ft., as stated, is indirect surface in the heating chamber. The supplementary supply of hot air is furnished to the main hall, living room, dining room and reception room on the first floor, and to four bed rooms and bathroom on the second floor. The outlets supplying air to the different rooms are brought through the floors directly under the radiators, coming through patented registers, which are of unusual construction.

These registers are shaped like a trough with a plate covering containing holes of varying sizes. (Through an inadvertence, these registers are drawn upside down in the plans). The holes nearest the center are small and grow larger toward the outer edges. In operation the registers accomplish their purpose of diffusing and lowering the velocity of the incoming warm air in an admirable manner.

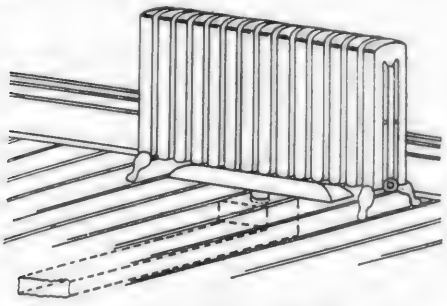
In addition to the other features of the system one of the most interesting is the provision for filtering the air and imparting to it some, though perhaps not a great deal, of humidity. This provision is shown on the sectional view of the heating chamber, where a ¾-in. perforated brass pipe is connected to the water supply, the perforations, pin holes of the smallest size, being drilled and spaced ½ in. apart and extending the full width of the heating chamber in a straight line. From this pipe a constant stream of



DETAIL OF HEATING CHAMBER AND CONNECTIONS, SHOWING WATER SPRAY FOR WASHING INCOMING AIR

water trickles, forming a partial sheet through which the incoming cold air is forced to pass. That it accomplishes its purpose is seen by the fact that the amount of dust in the house is unusually small, while the danger of dampness is not apparent.

The disposition of the vent ducts is another unique feature. The spaces between the floor beams and the studs



DETAIL OF HOT AIR SUPPLY UNDER RADIATORS. TROUGH-SHAPED REGISTER IS SHOWN UPSIDE DOWN

are utilized for this purpose. These vent ducts are carried to a vent flue in one of the chimneys, where the warm gases of the chimney effectually prevent any back draughts that might be caused by the wind.

As a further protection against the admission of dust into the house the owner has adopted the expedient of isolating the boiler room by means of asbestos partitions fitted with transoms. At times when the grate is shaken or ashes removed, the boiler room may be made tight by lowering the transoms, while a small vent flue in one corner of the boiler room effectually carries off the dust.

As regards the cost of the plant, it was in the neighborhood of $1,814 or about twice the cost of an ordinary direct hot water heating system. As operated, however, its consumption of 10½ tons of coal for the heating season is a remarkable showing, while the added comfort obtained through its ventilating features counts for much, as is enthusiastically attested to by the owner. In short the system represents a degree of refinement in residence installations that is not often seen and that was brought about in this case only by preconceived notions along the right lines which were held by the owner, and therefore giving the necessary latitude to the engineer.

This system works entirely automatically by the outside changes of the weather. Mr. Cluthe gives the inventor a patentee, and designer of it, and the details were worked out by George F. Clark, Heating and Ventilating Engineer, Newark, N. J. The architect is John F. Capen, Newark, N. J.

Leakage of Air Around Windows

Discussion of Mr. H. W. Whitten's Paper on this Subject, Read at the Annual Meeting of The American Society of Heating and Ventilating Engineers

PROF. KINEALY—I would like to have Mr. Whitten go a step further and tell us how many cubic feet of air will leak per lineal foot of sash per hour. If we know that, and we assume the temperature outside to be zero and the temperature inside to be 70°, we can at once calculate how many heat units will have to be supplied to compensate for that leakage.

MR. DONNELLY—In addition to the leakage around the cracks of window casings we have to consider the leakage through brick walls, for instance.

MR. WHITTEN—I will say for the benefit of Prof. Kinealy that a series of tests were conducted in Detroit about 1½ years ago under the supervision of some noted engineers, including Prof. Allen, these tests being made by forcing the air against various sash with different clearances. This test was embodied in an article written by Mr. B. S. Harrison and published in THE HEATING AND VENTILATING MAGAZINE for October, 1908, and another article, written by myself, published in the same magazine the following month, which was distributed to members of the society. I think that in my paper I stated that an average of 146 cu. ft. per lineal foot of sash joint with 1/16-in. clearance, will leak through, provided the

air has some means of egress after it gets in—that is, in some building tests we got figures of 185, and the difference is undoubtedly due to the recoil or splash effect of the wind in striking an obstruction.

PROF. KINEALY—As I understand, Mr. Whitten says that for every lineal foot of sash crack we may expect about 146 cu. ft. of air per hour to leak through. Now 146 cu. ft. of air will require about 3 B. T. U. to raise its temperature 1°—that is, 1 B. T. U. will raise 50 to 55 cu. ft. of air 1°. To raise the temperature of the air from zero, assuming it enters the room at zero, to 70° will take 70 x 3, or 210 B. T. U. As a result of investigations to determine the leakage of air through cracks of windows, I determined a good many years ago that the number of square feet of direct radiation surface to be put into a room to compensate for the leakage through the cracks of a window may be taken as equal to the square root of the area of the window in square feet. This means, of course, that where there are several windows, each window must be treated by itself in order to determine the radiation to be put in to compensate for the leakage past that particular window. Then I devised a formula in this way: It is not always possible to determine the exact number of lineal feet of crack surface, but the windows are so shaped that the lineal feet of crack surface is very nearly equal to the square root of the area of the window. A window 3 ft. wide and 8 ft. high will have two cracks each 8 ft. long and three cracks each 3 ft. long, making altogether 25 lin. ft. The area of this window is 3 x 8, or 24, and the square root of 24 is nearly 5, so that we have pretty nearly 5 times the square root of the area.

On this basis, I figured a rule something like this:

Radiation for window leakage = $\sqrt{s}$, s being the area of the window surface.

In old buildings I add about 50%. Each window is considered separately. For instance, one window having an area of 24 sq. ft. would require 5 sq. ft. of radiation for leakage. Two windows having an area of 24 sq. ft. each would require 10 sq. ft. of radiation for leakage. One window, however, having an area of 48 sq. ft. would require only 7 sq. ft. of radiation for leakage.

That is why hot houses having a large amount of glass surface will not lose as much heat per unit of area of glass as will windows. It is very common to figure glass surface in hot houses at a smaller rate of transmission than you figure windows. That is due entirely to leakage from cracks, and in estimating the requirements to heat a room we should take into account each window by itself, figuring out each window and multiplying the amount by the number of windows of that particular size.

MR. WHITTEN—I would like to ask Prof. Kinealy if he has ever taken note of the heat loss from the syphonic action exerted by moving outside winds on the sheltered sides of buildings, the air being drawn out by a partial vacuum.

PROF. KINEALY—Yes. I have made some measurements, but they were not satisfactory.

In regard to the filtration of air through the walls, there is very little data to be had. The filtration of air through unplastered brick walls and through lath and plaster, we know, is very great. Any one can notice on the ceiling of an ordinary room the white and dark lines showing the lath. The air filters through between the lath and makes a dark spot. The filtration does not take place nearly so much, if the surface of the plaster or brick wall is painted or even if the wall is papered. A coating of paper on the inside of a plastered wall reduces the filtration of air through that wall to almost nothing. It is very rare to see white and black marks on a papered ceiling, but you can always see them on an unpapered ceiling, providing the plaster has not been painted. Whenever air filters through, dirt and dust is deposited exactly as it would be in a filter.

The Rating of House Heating Boilers

A Method Proposed by a Committee of The American Society of Heating and Ventilating Engineers

The method of rating house heating boilers, as outlined in the accompanying report of the committee appointed by The American Society of Heating and Ventilating Engineers, was presented at the society's recent annual meeting by Prof. J. H. Kinealy, chairman of the committee. Following is the summary of his report:

The committee appointed by your society to take up the question of cast-iron boilers looked into the subject and found that some catalogues give information as to how boilers are really rated. We thought we ought not to touch, either in our report or in our recommendation, upon anything that in any way hampered the manufacturers in designing and manufacturing their boilers. We thought that free range should be given to every designer and manufacturer in order that he might do his best, irrespective of what others were doing.

We, therefore, omitted from our work on standards the consideration of heating surfaces of boilers, because we found that there were so many different kinds of heating surfaces that it would be impossible for us to enumerate them all, and to compare one with the other fairly.

We knew of the direct fire surface and of the horizontal flue surface, but how one compared with the other we had no means of knowing. We concluded that the rating of cast-iron boilers could be made on something that all boilers must have, and, after considerable discussion, we concluded the only thing they had in common and most nearly alike was the grate. So we concluded the area of the grate surface was the thing on which to base our standard.

Of course, that gave rise to the question of figuring the area of the grate surface. Should we measure directly at the level of the grate or at the top of the fire pot, and, if at the level of the grate, should we take into consideration any irregularities in the grate bars themselves?

We concluded the area of the grate should be the horizontal area directly above the grate surface, omitting entirely the irregularities in the grate due to the type of grate bars. Taking that as a basis, we saw our way clearly to something else.

The next thing was, how much heat should we expect from a boiler having a certain grate surface? For the purpose of making our ratings similar, we assumed that 1 lb. of steam was equivalent to 1,000 B. T. U. and we thought with that basis the results we could get from a small boiler would not be nearly as efficient as those from a large one, for the smaller boiler—that is, one having a small grate surface—burns coal at a slower rate than the larger one.

Next came up the question as to how large the fire pot ought to be—how long a time should elapse between the firing. We thought, in the case of a small boiler, the firings should be less frequent than in a large boiler, for the reason that small boilers are usually taken care of by women, whereas larger boilers are taken care of by men, the very large ones, of course, being fired by some one whose duty it is to care for the boiler continuously.

So in the accompanying table you will notice that, with the various grate surfaces, we have given in the second column what we might call the weight of the coal in the fire pot for each size of grate. This is the weight of the coal, without any fire, on top of the grate surface, when the pot is filled up level with the bottom of the fire doors.

Then came the question of testing whether or not such a boiler was a standard boiler. If we build a fresh fire in a boiler and run the boiler for 1 or 2 hours only, then test it, we might get a very different result than if we ran it for a long time. We thought that, after the fire is

built in a boiler and the boiler charged, it should run for the time indicated in the table without any fresh charging.

Summing up, the committee bases its ratings on the area of grate surface, and the condition of the draft with the boiler installed must be such that the boiler will burn the amount of coal per hour given in the column marked "Coal per hour." It is for the user of the boiler to build his chimney so that the draft of the boiler will burn the stated amount of coal. You would then have a standard boiler under standard conditions.

Under such conditions, after a boiler has been charged, it must be run without any further firing for a definite length of time and then a test of one hour must be run during which the boiler must generate the amount of steam indicated in column 3. This standard boiler would carry the amount of radiation given in the last column of the table:

TABLE OF PROPOSED STANDARD BOILERS.

Grate area. Square feet.	Coal per hour. Pounds.	Steam per hour. Pounds.	Coal in pot. Pounds.	Time. Hours.	Radiation.
2.....	7.5	67.5	90	6	250
3.....	15	135	135	4.30	500
4.....	22.5	202.5	140	4	750
5.....	30	270	225	3.45	1,000
9.....	60	540	405	3.20	2,000
13.....	90	810	585	3.15	3,000
17.....120		1,080	765	3.10	4,000
21.....150		1,350	945	3.10	5,000
25.....180		1,620	1,125	3.10	6,000
29.....210		1,890	1,305	3.05	7,000

The table is based on a maximum combustion rate of coal of 7.5 lbs. per square foot of grate per hour, so that theoretically the amount of coal burned in the first boiler listed would be 15 lbs. per hour. Instead, 1 sq. ft. is subtracted from the grate surface in every case to take into account the fact that there are ashes in the fuel, and it will be found that the second column is equal to the combustion rate of 7.5 multiplied by 1 less than the number of square feet of grate. If c stands for the coal burned per hour, $c = 7.5 \times (g - 1)$. If we multiply by, say, 9,000 as the heat units available from one pound of coal, and divide by 1,000 heat units as the equivalent of 1 lb. of steam, the third column, or $s = 67.5 (g - 1)$. The amount of radiation which a boiler is capable of supplying is equal to the number of pounds evaporated per hour multiplied by the number of square feet of radiation which 1 lb. will supply. This number of square feet is, roughly, 4 sq. ft., but it will be noticed that if we multiply the expression of the value of S by 3.7, we find that R, the amount of radiation $= 250 (g - 1)$. If we assume that the firepot averages about 10 in. from the grate level to the top level of the fuel, the coal capacity will be equal to $v = 0.9 \times 50 \times g$, in which 0.9 is the fraction of a foot representing the depth of the fuel, and 50 pounds is the weight of 1 cu. ft. of coal. That is, $v = 45\ g$. The time which the test should be allowed to run before a record is made of one hour's evaporation is assumed to be equal to half of the duration of time that the boiler should be capable of running theoretically. In other words, $t = v \div 2c = 45\ g \div 2 \div 7.5 (g - 1) = 3\ g \div (g - 1)$.

DISCUSSION

PROF. CARPENTER—It seems to me the committee's report is practically along the right lines, and in starting at the lower limit it agrees very well with my experience. I have found out, from practical observation, with the coal we get in the East, the small heating boilers used under ordinary conditions can be made to burn about 4 lbs. of coal per square foot of grate per hour. Just where the limit in size of grate is reached when you could increase this amount I do not know, but it is quite obvious that as the grate increases in size more coal can be burned per square foot of grate per hour. I know, in an upright boiler at Cornell University, we will run possibly 5 lbs. in some cases. I am speaking, of course, of anthracite coal, so that I believe, if the heater is to be satisfactory for a residence, and if it is not designed to burn the anthracite coal of the East, it must be designed practically on

the basis that it will burn about 4 lbs. of coal per square foot of grate per hour.

Regarding the heat value of coal, for anthracite, this varies a good deal, depending on how much ash it carries. Last year, I had an investigation in charge in which the specifications required us to get anthracite coal, which would run something like 15,000 B. T. U. per pound. About 12,500 B. T. U. per pound is about as high as anthracite coal of Eastern Pennsylvania will run commercially.

Where we burn about 4 lbs. of coal per square foot of grate per hour we get very high efficiency. I found from a test of three or four boilers that the power boiler does not begin to approach the efficiency of a good, clean heating boiler. Worked under the same conditions, the power boiler is considered to be doing very well if it averages 75% efficiency, and you can secure that result very readily with many of the heating boilers.

There is a great difference between the construction of a power boiler and a heating boiler. Heating boilers are made, as a rule, from measurements of about 8 sq. ft. of heating surface to 1 sq. ft. of grate. Power boilers, for anthracite coal, have about 40 sq. ft. of heating surface to 1 sq. ft. of grate, and for soft coal the ratio is 60 to 1.

I feel that the heating boilers should be rated to burn a small amount of coal per square foot of grate per hour. I should say somewhere around 5 lbs. It is rather important that the society should say definitely what the makers of small heating boilers should rate their boilers on, because I find that different boiler makers use different methods. For instance, I figured out from a catalogue of a boiler maker, the ratio of grate surface which he had for his radiation, and in order to supply that radiation he had to burn in his boiler over 8 lbs. of coal per square foot of grate per hour. He had a small boiler with only 3 sq. ft. of grate.

MR. BARWICK—Has Prof. Kinealy any tests with reference to the draft power, as I think it would be well to set a standard for that?

PROF. KINEALY—We could not get any information on that point. It is easy enough to say how much coal ought to be burned, if you specify the draft. Nobody seemed to know anything about the draft for house boilers.

We might have started with the draft. Our idea was to make a standard for the boiler, and then set a standard condition, and it would work out this way: If a boiler were put in to carry 1,000 sq. ft. of radiation and did not carry it satisfactorily, the boiler man could make a test and see whether or not the draft was sufficient to burn this amount of coal per hour. If it was, then it was a standard boiler under standard conditions.

Bursting Tests on 1-In. Standard Cast Iron Fittings

Some tests recently made by Crane Co. of 1-in. ells made by eight leading manufacturers, including those of its own make, are reported in the Valve World. Three sample ells were procured with which three separate tests were made. The table shows the lowest and the highest pressures at which the fittings broke in these tests, together with the average of the three tests. The names of the competitors, of course, are omitted.

	Lowest pressure at which castings burst	Highest pressure at which castings burst	Average of three tests
Crane	7300 lbs.	8000 lbs.	7666 lbs.
	7000	7500	7333
	6400	7500	7066
	5000	8400	7133
	6000	8200	7166
	5800	7900	6733
	4400	8200	6533
	2500	5800	3866

Commenting on the tests, the writer says "while this test shows that in some instances there is an enormous difference between the weakest and the strongest fittings, even the weakest of these fittings has abundant strength for the work for which it is recommended.

"This, of course, can be said only of the smaller sizes of fittings, for when we come to the large sizes the factor of safety in these fittings is nowhere near so great as in the small sizes, and therefore it will be seen at once that if they are made of the same material as the weakest of the small sizes there is great danger of getting into serious trouble."

Ventilation of a Banking Room or Separate Offices

By Charles L. Hubbard

A problem which frequently comes to the attention of the ventilating engineer is that of improving the conditions in offices and banking rooms located in the buildings where no provision has been made for ventilation other than through open windows. Work of this kind is often very difficult to carry out in a satisfactory manner for various reasons, among which may be mentioned their distance from basement or other unfinished rooms where apparatus may be placed and because of the difficult in concealing ducts and flues, which are always more or less unsightly in a handsomely finished room. Cases of this kind are as a rule best treated by supplying a generous volume of warm fresh air at a temperature of 68° to 70° by means of a fan and allowing it to escape by leakage through doors and transoms. In some instances, however, if the rooms are tightly closed and there is little passing in and out, or if there are no transoms opening into corridors and stairways, it is necessary to provide some special means of discharge ventilation.

When the arrangement of rooms is such as to make it possible, this is most satisfactorily done by providing a strong fan discharge from the toilet rooms, thus making the general direction of the air movement toward these rooms and so prevent any odors from being carried into the occupied rooms. It is not generally necessary to make any provision for warming the air above 70° because the class of rooms under consideration are always heated, and usually by direct radiation. This being the case it is usually best to keep the ventilating system separate unless it so happens that the present method of heating is not of sufficient capacity, in which case the size of heater at the fan may be increased to make up the deficiency. The sketches given herewith are from an actual installation of this kind which gave very satisfactory results. The space ventilated is shown in diagram in Fig. 1, and consists of a large banking room containing regularly a force of about 70 people, which, during banking hours, is likely to reach 100 or more on busy days, when the customers in the public space are taken into acount. None of the partitions extend to the ceiling, so the whole space is treated as a single room.

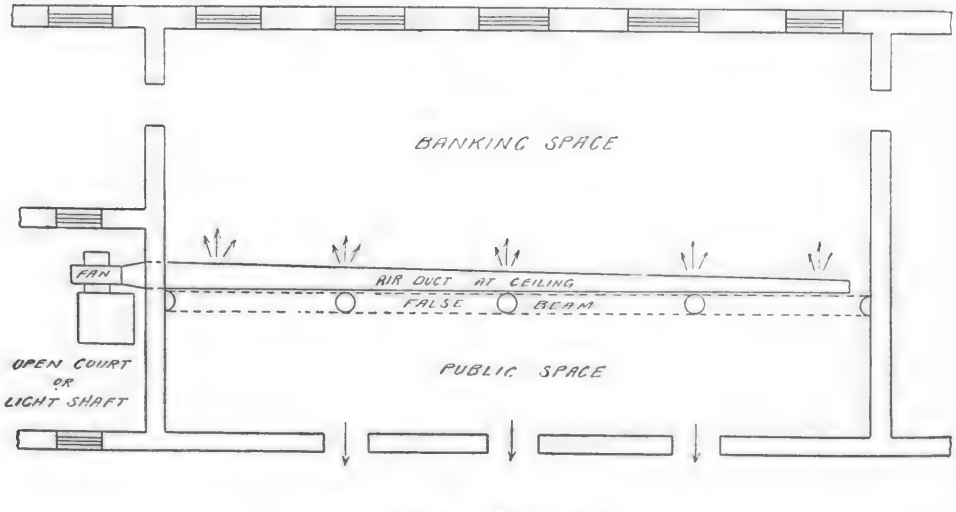


FIG. 1.—BANKING ROOM, SHOWING METHOD OF AIR SUPPLY

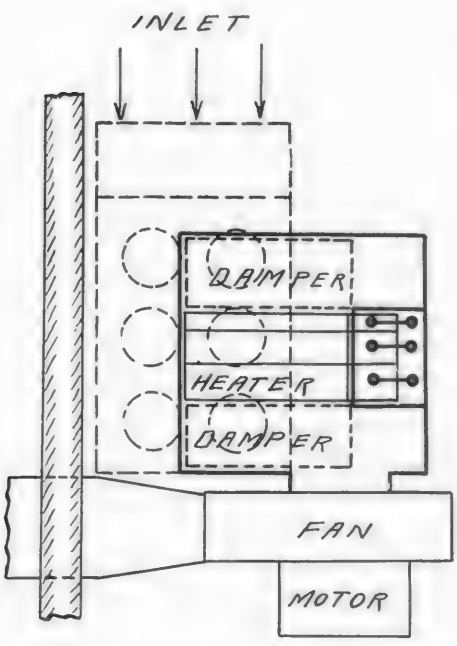


FIG. 2—ARRANGEMENT OF HEATER AND FAN

The air supply is based on 45 cu. ft. per occupant per min. for 100 people, making a total of 4,500 cu. ft. per min., or 270,000 cu. ft. per hour. The fan and heater are placed upon a low roof forming the bottom of an adjacent court, and the supply duct is carried along the ceiling of the banking room behind a large ornamental beam, thus being entirely concealed from the public space. Air is delivered to the room through diffusers in the side of the duct. Discharge ventilation is through the doorways and transoms opening into the main corridor and which always stand open during banking hours except in extremely cold weather. The fresh air supply is taken directly from the court, as it was found to be freer from smoke and soot at this level than higher up and in line with adjacent chimneys. A narrow space between buildings opens into this court or light well on one side, thus producing an ample circulation of air to keep it fresh.

In order to eliminate soot and dust as far as possible, the air is drawn through filter bags of a moderately fine bunting such as is used for flags and decorating purposes. (Figs. 2 and 3.) Six of these are used, each 13 in. in diameter and 48 in. in height, thus presenting an over all area of about 80 sq. ft. of filter surface, and calling for a velocity of approximately 60 ft. per minute through them, which is within safe limits, provided the bags are cleaned at frequent intervals.

The heater is of the usual hot-blast type made up of vertical 1 in. pipes, 10 rows deep, and divided into three separately valved groups. Two of these are made up of 4 rows of pipe each, and one of 2 rows, making it possible to use two, four, six, eight or ten rows as the weather conditions may call for. The heater sections are 3 ft. in width by 4 ft. in height and contain a total of about 230 sq. ft. of heating surface. This is figured by the formular $S = (V \times 1.3) \div E$ which applies only to cases where the air is to be raised through a temperature of 70 degrees.

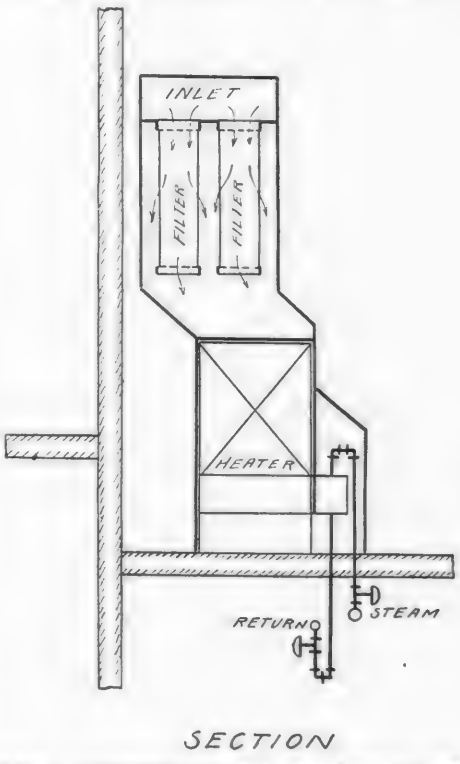


FIG. 3—SECTIONAL VIEW OF HEATER SHOWING AIR FITTERS AT INLET

In the above—S = square feet of heating surface required, V = cubic feet of air warmed per hour through 70°, E = efficiency of heater, = 1,500 for pipe heater and low pressure steam under the conditions of the problem.

It will be noticed in Fig. 3 that the steam and return mains and all valves, siphons, etc., are located inside the building to avoid freezing when steam is shut off, and, further, the connections are such that there are no pockets for the accumulation of condensation in any of the piping above the roof.

heater. Each section of the heater has a siphon loop in the return connection to prevent any backing up of condensation from one section into another which is liable to be troublesome in very cold weather. In case of a heater of this kind placed in a location which is not conveniently reached it is very important to provide for positive air venting under all conditions. This is best secured by using a cock which can be left open a very little and allowed to blow slightly. This keeps the heater free from air at all times and the waste of steam is so small as to be

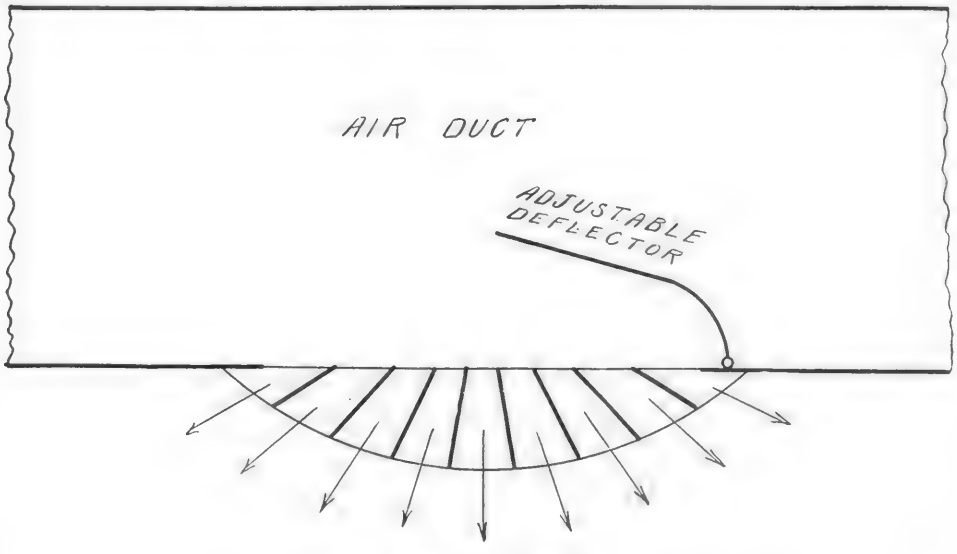


FIG. 4—ONE OF THE AIR OUTLETS IN BANKING ROOM

As automatic temperature control was already attached to the direct radiators, the system was extended to the main heater and the supply and return connections provided with pneumatic valves, the same being operated by means of three-way cocks located at a convenient point. The air is maintained at a uniform temperature of 70° by means of a graduated mixing damper over the heater, the same being operated automatically by means of a hot-air thermostat placed in the main air-duct. A dial thermometer is also connected into the side of the duct for a guide in setting the thermostat and in operating the valves on the

neglected in comparison with other wastes. If the air valves are easily accessible and are inspected frequently an automatic valve of good design may be used. The fan used in this case is of the enclosed steel plate type with a single inlet connected with the heater casing. It has a 3 ft. wheel driven at a speed of 390 R. P. M. by a direct-connected electric motor of 2 H. P. The motor is enclosed in a water-tight galvanized iron casing and is ventilated through four 1 in. holes in the bottom of the casing and an opening of the same area from the motor enclosure into the fan housing, which ensues a constant flow of cool air over the motor.

The method of air distribution has already been described and is shown in Fig. 1. A detail of one of the air outlets is shown in Fig. 5, and shows the device used for diffusing it and preventing cool down drafts. The volume of air delivered through each opening is regulated by the adjustable damper or deflector shown inside of the duct. This should be arranged so that it may be securely fastened in place after it is properly set.

A ventilating system of this kind should be under the direct care of one man who will keep it in adjustment, see that the proper number of sections of the heater are used to bring the air temperature within the range of the mixing damper, and to clean the filters at proper intervals. When properly cared for such an arrangement as that described will give very satisfactory results.

Tests of Steam Heating Apparatus

1.—Cast Iron House Heating Boilers
2.—Automatic Steam Pump and Receiver

Tests of two cast-iron house heating boilers, of an automatic steam pump and receiver and of a central station electric light and heating plant were included in a report of the Committee on Tests. Prof. J. D. Hoffman, chairman, presented at the recent annual meeting of the American Society of Heating and Ventilating Engineers. The figures on the central station heating plant were taken from an article published in THE HEATING AND VENTILATING MAGAZINE for October, 1908. The results of the other two tests are presented herewith:

Test on Two Cast Iron House Heating Steam Boilers

DATA SUBMITTED BY ROY E. LYND, DOVER, N. J.

The tests, data of which follow, were taken upon two boilers connected in the same manner to the same flue. The opening in the ashpit below the grate for air inlet was proportionally the same for each boiler. The fire was built with wood and coal, which had both been weighed. The fire was allowed to burn until the boiler ceased to steam. The total time from lighting the fire to the time when the boiler ceased to steam was the number of hours used to get the average rate of fuel consumption, average rate of evaporation, etc.

Boiler No. 1 showed a higher rate of combustion and a higher absorption of heat per square foot of heating surface than boiler No. 2, and at the same time showed less efficiency. The B. T. U., per pound of coal utilized in the boilers, is almost exactly proportional to the ratios of heating surface. Compare items 4 and 36 in the two tests. Item 20 is figured from actual rate of evaporation in the middle of the test after everything had been warmed up and the fire had a bed of bright coals to the full depth of the firebox, and upon a uniform average rate of combustion throughout the test. This last assumption is possibly not strictly true, as the fire should burn much faster in the middle of the test, when the coals were clear and bright and no part of their surface or of the voids between them had been deadened by ash.

The calorimetric equivalent of the boiler, and also the radiation from the surface of the boiler were allowed for as the test was started with the boiler cold, and the boiler was not covered. An average of items 16 and 20 would indicate that the customary allowance of 8,000 B. T. U. per pound of coal is conservative for both of these boilers, although boiler No. 1 is conservatively rated and boiler No. 2 is overated.

TEST ON TWO CAST IRON HOUSE HEATING STEAM BOILERS, MADE NOVEMBER 24, 1908.

	Boiler No. 1	Boiler No. 2
(1) Description of boiler: Cast iron sectional steam boilers.		
(2) Square feet grate surface	9.225	15.42

(3)	Square feet heating surface	116	222.2
(4)	Heating surface to grate surface	12.6 to 1	14.4 to 1
(5)	Square feet exposed surface	80	104.4
(6)	Pounds wood used (total)	90	157
(7)	Calorific value of wood	5,000	5,000
(8)	Total pounds of coal used	400	632
(9)	Calorific value of coal	14,000	14,000
(10)	Equivalent total coal, pounds	432	688
(11)	Equivalent coal per square foot grate, pounds	46.8	44.7
(12)	Equivalent coal per square foot grate per hour, pounds	7.2	5.1
(13)	Water fed to fill boiler, pounds	693	1,424
(14)	Water evaporated, pounds	2,166	3,733
(15)	Equivalent evaporation per hour from and at 212°, pounds	437.8	584.6
(16)	Equivalent evaporation from and at 212° per pound coal, pounds	6.59	7.44
(17)	Equivalent evaporation per hour from and at 212° per square foot grate, pounds	47.45	37.94
(18)	Maximum actual rate of evaporation per hour reached during test, pounds	600	706
(19)	Maximum equivalent evaporation from and at 212° from (18) pounds	721.2	847.8
(20)	Maximum equivalent evaporation from and at 212° per pound, coal, pounds	10.85	10.64
(21)	Maximum equivalent evaporation per hour from and at 212° per square foot grate pounds	78.12	54.26
(22)	Average temperature feed water, deg	53	50.8
(23)	Average temperature steam at 0 lbs. pressure	212	212
(24)	Average temperature boiler	For 0.5 hr., 132 For 6.0 hr., 200	0.75 hr., 131.4 8.00 hr., 200
(25)	Average temperature room, degrees	65	55.5
(26)	Average temperature flue gases	Not taken.	Not taken.
(27)	Time from starting fire to reaching pressure of 0 lbs., hour	0.5	0.75
(28)	Time from reaching pressure of 0 lbs., to end of test, hours.	6	8
(29)	B.T.U. supplied to heat original water to temperature (23)	110,810	230,550
(30)	B.T.U. supplied to evaporate (14) lbs. water at temperature (23)	2,438,100	4,351,200
(31)	B.T.U. radiated from boiler during test	109,890	189,800
(32)	B.T.U. absorbed by boiler in heating from (22) to (24)	89,053	168,550
(33)	Total B.T.U. supplied by (10) lbs. coal in (27) plus (28) hrs.	2,747,853	4,940,100
(34)	B.T.U. per square foot grate per hour	45,826	36,614
(35)	B.T.U. per square foot heating surface per hour	3,644	2,541
(36)	B.T.U. per pound coal	6,365	7,180
(37)	Efficiency of boiler, per cent	45½	51.3
(38)	Steam rating from (15), square feet	1,691	2,258.3
(39)	Steam rating from (19), square feet	2,786	3,275
(40)	Advertised steam rating, square feet	2,250	4,400

Test of an Automatic Steam Pump and Receiver

DATA SUBMITTED BY C. F. NEWPORT, CHICAGO

The test was made December 2, 1907. The boilers are two No. 12 locomotive firebox boilers, with a capacity of 4,400 sq. ft. radiation each. The boilers were originally in the basement in pit, with a system operating under low pressure gravity. They are now situated in boiler room at grade, above the mains in basement, and about 30 ft. from the building that is warmed. The total amount of radiation in the building is 5,800 sq. ft., of which 2,743 sq. ft is Italian flue, 2,946 sq. ft. National and Perfection, and about 111 sq. ft. of uncovered mains in basement.

The pump is situated 83 ft. from the boilers. The main steam supply is 6 in. and is carried outside between the buildings 30 ft., this being double covered. The rest of the 6-in. pipe is uncovered. The main steam supply is carried outside the building about 40 ft., where it connects to an 8-in. header through a reducing valve. The pump is located a few feet from the 8-in. header and on basement floor. Some of the readings are:

Mean temperature of outside for day, degrees.....26
Mean temperature during 16 hr. run, degrees.....20

Mean temperature of heating season, degrees.....35
Average pressure on pump, pounds..... 5
Average pressure on house, pounds.....1½
Average head against pump, feet.....15
Average temperature of return on discharge from pump, degrees.....205

The combination is a 6 x 2½ x 6 in. automatic duplex pump and receiver, with 1 in. feed, 1¼ in. exhaust. 2½ in. section, 2 in. discharge, average length of stroke 5⅜ in., and piston rods 1⅛ in. in diameter. A pail holding 21¾ lbs. of water was used for collecting the pump condensation, and it was found to require 832 double or 1,664 single strokes of the pump to fill the pail. The equivalent of one pail of pump condensation is obtained as follows:

Area of cylinder, square inches	4.908	
Area of piston rod, square inches	0.994	
Each single stroke, cubic inches	26.3805	
1,664 single strokes, cubic inches	43,897.15	
Deduct for piston rods (832 strokes × 0.994 × 5⅜ in.), cubic inches	4,445.15	
Total, cubic inches	39,452.00	=22.252 cu. ft.
Less 5% for slippage		1.112 cu. ft.
		21.14 cu. ft.

This amount of radiator condensation pumped at 60 lbs. per cubic foot (water at 203°) is 21.14 × 60 = 1,268.40 lbs. to one pail of 21.75 lbs. of pump condensation.

In the test the pump was started at 5.30 a. m. and stopped at 9.40 p. m., running altogether 16 hrs. and 10 min. Steam was put on the house at 5.35 a. m. and turned off at 9.40 p. m., so that the steam was on during a period of 16 hrs. and 5 min. Filled pails of pump condensation were obtained at the different times stated in the table below, which gives also the pressure of the steam, the temperature of the return and the pressure of steam delivered to the pump. It will be noted that 30 min. after the steam was turned off and the pump was stopped 3¼ lbs. of water were collected. The 13 pails of water with the 3¼ lbs. obtained at the end of the test give a total weight of pump condensation of 286 lbs.

AVERAGE RADIATOR CONDENSATION FOR HEATING SEASON

The conditions are then compared for outside temperatures of 26° and 35°. It is shown above that 21.75 lbs. of pump condensation corresponds to 1,268.4 lbs. of radiator condensation, so that 1 lb. of pump condensation corresponds to 58.3 lbs. of radiator condensation. The 286 lbs. of pump condensation for the test of 16 hrs. and 5 min. means that the total radiator condensation is 286 × 58.3 = 16,679 lbs., or 1,037 lbs. of radiator condensation for 1 hr. There being 5,800 sq. ft. of radiation in the building, the condensation per hour per square foot of radiation is 0.179 lbs. The foregoing figures are for an out-

		Temp. of return. Degrees.	Pressure on pump. Pounds.
7.00 a.m.	3 lbs. on house.	...	..
8.30 a.m.	3 lbs. on house.	...	..
9.40 a.m.	2½ lbs. on house.	...	..
10.45 a.m.	2½ lbs. on house.	...	..
11.55 a.m.	2½ lbs. on house.	208	..
1.25 p.m.	2 lbs. on house.	204	..
2.35 p.m.	2 lbs. on house.	...	..
3.45 p.m.	1½ lbs. on house.	...	..
4.55 p.m.	1½ lbs. on house.	201	5
6.05 p.m.	1½ lbs. on house.	206	5
7.15 p.m.	1½ lbs. on house.	...	5
8.25 p.m.	1½ lbs. on house.	...	5
9.40 p.m.	1½ lbs. on house.	...	..
10.10 p.m.	3¼ lbs. water.	...	..

side temperature of 26° F. For conditions with an outside temperature at 35°, or the average for a season of 8½ months, it is assumed that only 0.8 as much heat is required as at 26°, and, therefore, the radiator condensation per hour per square foot—that is, for the average day—is 0.8 × 0.179 = 0.143 lbs.

COST OF HEATING FOR A SEASON ON BASIS OF PUMP AND RECEIVER TEST

The test indicated for the average day of heating, over a heating period of a little over 16 hrs., that 286 lbs. of pump condensation was involved. Assuming for the average case of 35° degrees outdoors that the heating requirements are 0.8 of what they are at 26°, it is also assumed that the pump condensation will similarly be 0.8 of 286, or 228.8 lbs. For 30 days in a month and 8½ months for the season, the total number of pounds of pump condensation amount to 58,344. As this has been delivered to the pump in the form of steam, and on the assumption of 8 lbs. of steam produced with the burning of 1 lb. of coal, the total number of pounds of coal involved in a season is obtained by dividing 58,344 by 8, or 7,293 lbs., which is equal to 3.646 tons. At $4.25 per ton this makes the cost of coal amount to $15.50. To this is added an allowance of one-quarter of 1%, for the additional coal required to make steam at 5 lbs. pressure as against 1½ lb. pressure, making the cost $15.54. The cost of a month's fuel on the basis of the average heating conditions over a period of 8½ months is thus $1.83, or, for one day, 6.1 cents.

The report concludes with the statement that the pump developed 0.009 H. P. As the steam condensation of the pump amounted to 286 lbs. in the test, which corresponds to an hourly requirement of 17.78 lbs., the pump requirements per hour per horse power seem to be no less than 17.78 ÷ 0.009 = 1975.5 lbs. of steam.

Design of Furnace Heating Systems, with an Application to a Ten-room Residence

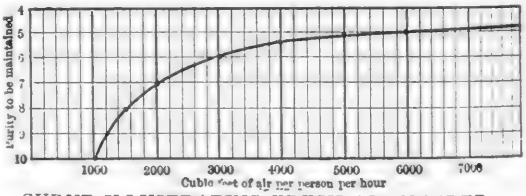
By Prof. J. D. Hoffman

(Concluded from March issue)

APPLICATION

In our ten-room residence, here shown, the heat loss H on a zero day by formula is, say, 100,000 B. T. U. per hour. This will give Q = 90,909 cu. ft. per hour as a heat carrier. Assuming as a maximum that 10 people will be in the house, and that they will need 18,000 cu. ft. of fresh air per hour for ventilation, this air will carry away approximately 22,900 B. T. U. per hour, making a total heat loss from the building of 122,900 B. T. U. per hour. Now, if the furnace is 60% efficient, and it burns 5 lbs. of 14,000 B. T. U. coal per hour per square foot of grate, we will have the area of the grate = 122,900 × 144 ÷ (0.60 × 14,000 × 5) = 421 sq. in. This gives a grate 23.2 in. in diameter.

With coal at 13,000 B. T. U. per pound, the grate would be 454 sq. in., or 24 in. in diameter. In either case, a 24-in. grate would be selected. With the assumptions as made above, the formula becomes G. A. = 0.0035 H for the better grade of coal, and G. A. = 0.0037 H for the poorer grade of coal, from which the following may be taken:



CURVE ILLUSTRATING FRESH AIR NEEDED PER HOUR PER PERSON

Grate area in square inches =

0.0036 H ..... (16)

This value may be checked with the catalogue rating, which is usually given in capacity of room space the furnace

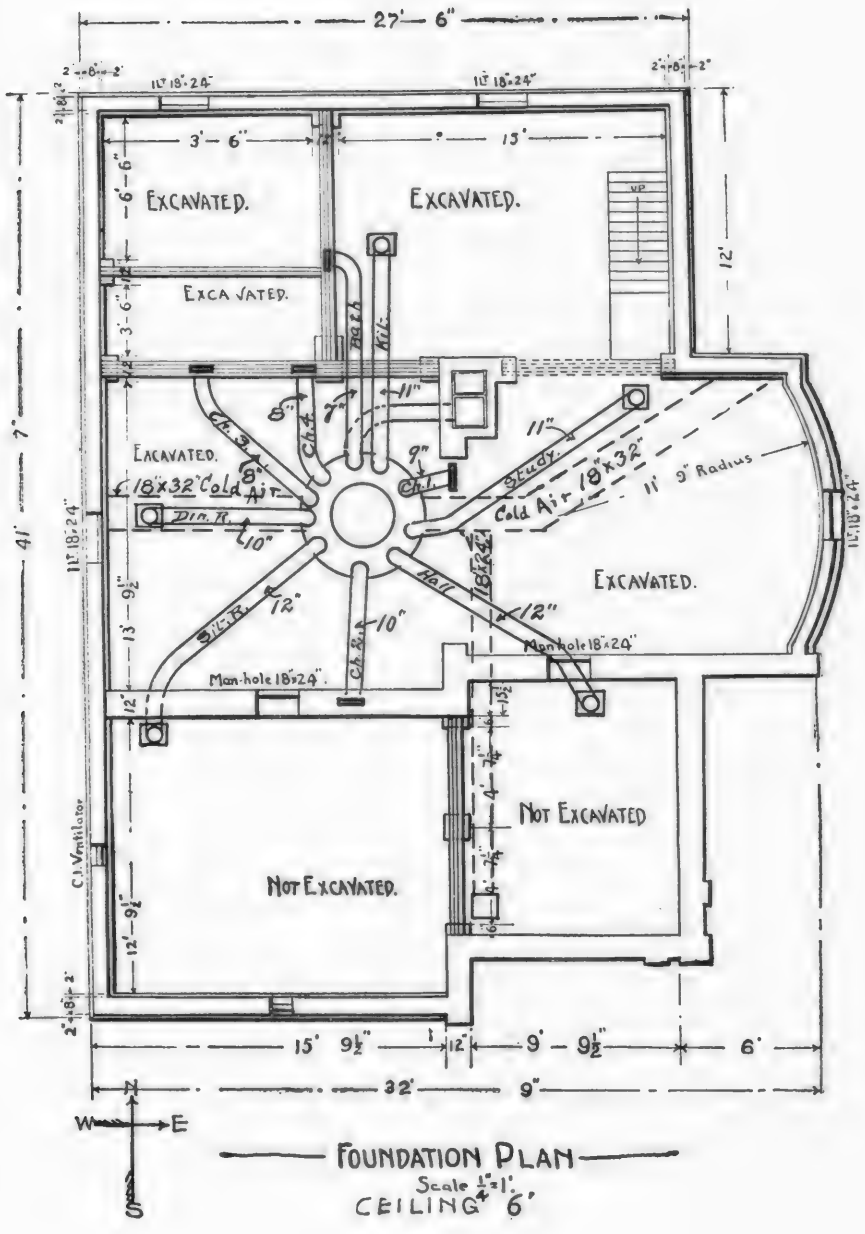
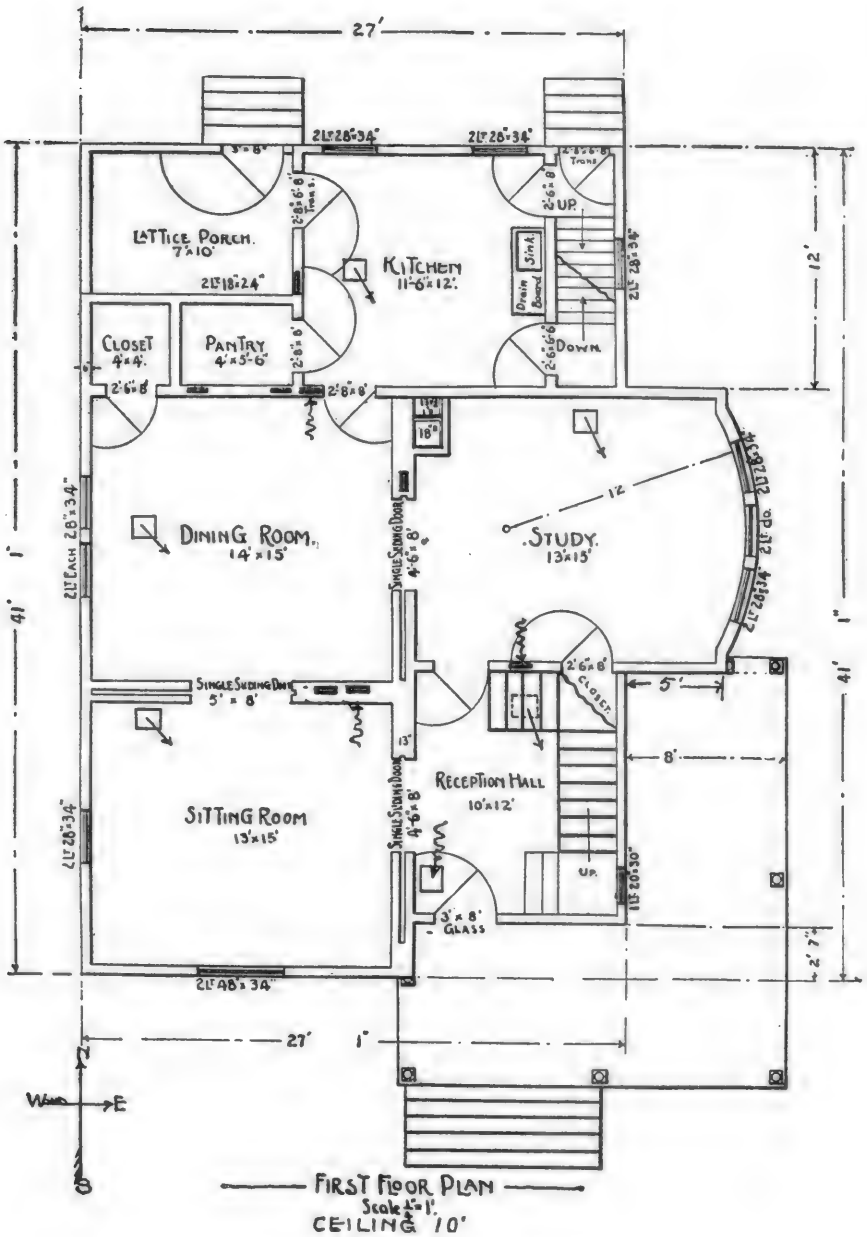
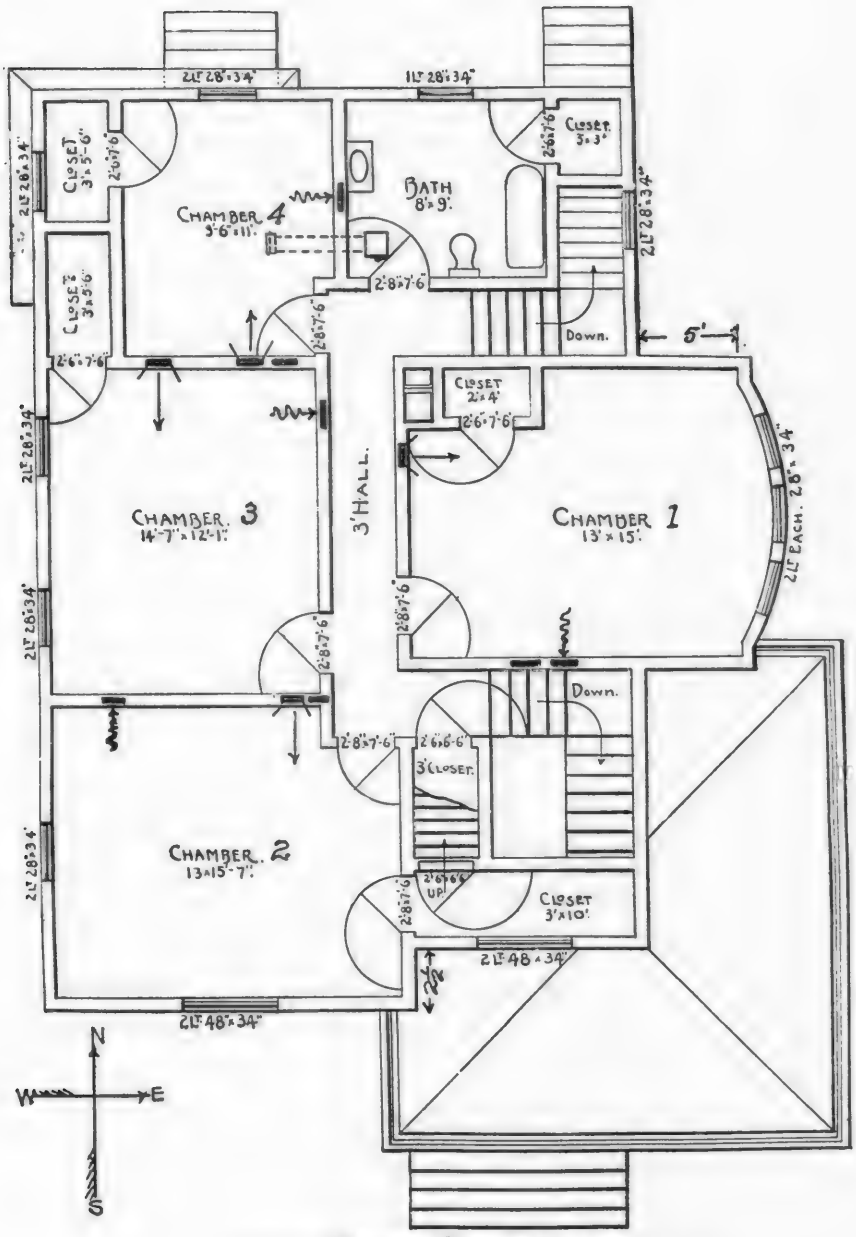

27' 6"
EXCAVATED.
EXCAVATED.
EXCAVATED.
EXCAVATED.
NOT EXCAVATED.
NOT EXCAVATED
Cold Air 18"x32"
Cold Air 18"x32"
11' 9" Radius
Manhole 18"x24"
Manhole 18"x24"
Ch. 3
Ch. 4
Ch. 1
Ch. 2
Ch. 3
Ch. 4
Dining R.
Study
Hall
Kit.
Bath
V.P.
C.I. Ventilator
41' 7"
32' 9"
15' 9½"
9' - 9½"
6'
N
W
E
S
FOUNDATION PLAN
Scale 1/4"=1'.
CEILING 6'

PLATE I.



FIRST FLOOR PLAN
Scale ¼"=1'.
CEILING 10'

PLATE II.



SECOND FLOOR PLAN
Scale. 1/4"=1'.
CEILING 9'

PLATE III.

TABLE

Formula $\left(G + \frac{W}{4} + .02nC.\right) 70 = H$

Room.	G.	.25 (W – G).	.02nC	N	H	Q.	Area Net Heat Reg.	Heat Reg. Size.	Area Heat Stack.	Area Leader.	Area Net Vent. Reg.	Vent. Reg. Size.	Area Vent. Stack	Remarks
Sitting room	38	85	78	2	14,000	12,727	140	14 × 16	.....	100	112	12 × 14	67	Allow for cold floor.
Dining room	28	28	84	2	10,800	9,818	108	12 × 14	.....	77	86	10 × 12	52	" 10 per cent for closet and exposure.
Study	42	52	78	2	13,250	12,045	132	14 × 16	.....	94	106	12 × 14	64	" " " " exposure.
Kitchen	28	65	55	2	11,900	10,818	119	12 × 14	.....	85	95	12 × 12	60	" 15 " " " " pantry, stair and exposure
Reception hall	29	73	104	3	14,000	12,727	140	14 × 16	.....	100	112	12 × 14	67	" for floor and hall well on second floor
Chamber 1	42	45	35	1	9,400	8,544	94	12 × 12	61	67	75	10 × 12	45	" 10 per cent. for exposure.
Chamber 2	38	60	36	1	9,850	9,854	98	12 × 12	64	70	78	10 × 12	48	" 8 " " " south closet.
Chamber 3	28	26	31	1	6,600	6,000	66	9 × 12	43	47	53	8 × 10	32	" 10 " " " closet and exposure
Chamber 4	28	30	22	1	5,600	5,091	56	8 × 10	36	40	45	8 × 10	27	Add closet to room.
Bath	14	17	26	2	4,400	4,000	44	8 × 10	28	31	35	8 × 8	22	Allow 10 per cent. for closet and exposure
Totals	315	481			99,800					711				

Diameter of grate allowing ventilation for ten people = 24 inches. Cold air duct = 569 square inches = 18 × 32 inches.
In selecting the various stacks and leaders it would be well to standardize as much as possible and avoid the extra expense of installing so many sizes. This can be done if the net area is not sacrificed.

will heat. The proposition of selecting a furnace will be much simplified when the committee on standards succeeds in lining the manufacturers up to a standard code regarding heating surface, grate surface, wind area and the like.

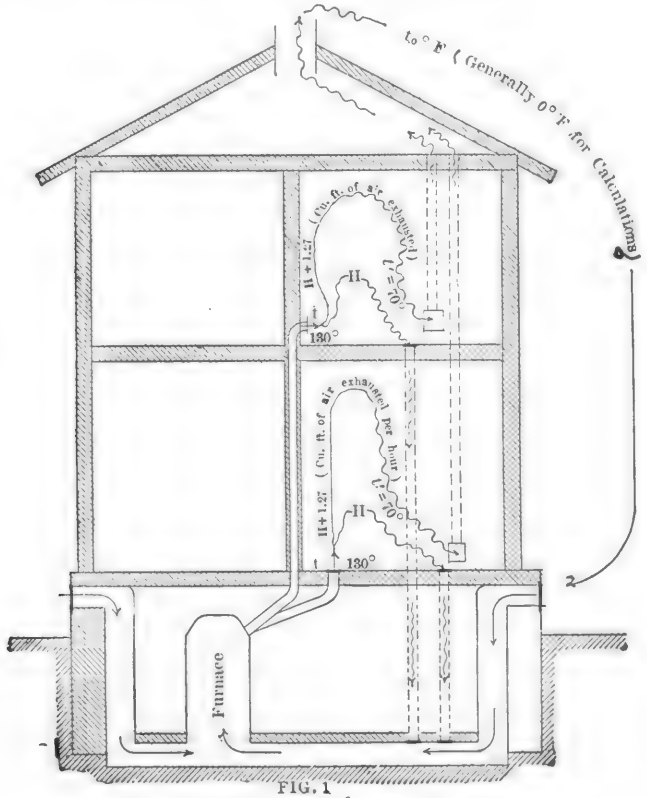


FIG. 1

DIAGRAM ILLUSTRATING AIR CIRCULATION IN FURNACE HEATING

APPLICATION OF THE FORMULAS TO A TEN-ROOM RESIDENCE

In every design the calculations should be made complete and tabulated for easy reference and comparison. These tabulations then should be kept for future reference. The following table is a complete summary of the calculations for the furnace design shown in Plates I, II and III, the heat losses *H* being figured by the "Carpenter" formula.

The Practical Requirements of the New York State Factory Ventilation Law

The following series of questions and answers are being sent out to owners and landlords of factory buildings in New York State by State Factory Inspector William W. Walling:

Q. What is meant by "proper and sufficient" ventilation?

A. As defined by Dr. John S. Billings, perfect ventilation means that any and every person in a room takes into his lungs at each respiration air of the same composition as that surrounding the building, no part of which has recently been in his own lungs or those of his neighbors, or which consists of the products of combustion generated in the building, while at the same time he feels no currents or drafts of air, and is perfectly comfortable as regards temperature, being neither too hot nor too cold.

Q. How much air is required to meet these conditions?

A. Not less than 2,000 cu. ft. per hour for each person, with the same amount per hour for each cu. ft. of gas consumed whether for light, heat or power.

Q. How can this amount of air be furnished?

A. By the use of mechanically driven fans, either forcing fresh air into a room, or exhausting the foul and vitiated air from the room. By either method, there is a positive and constant change of air, independent of atmospheric or climatic changes.

Q. When machines using gas are properly hooded, is the above amount of air necessary?

A. No, if the products of combustion are directly removed from a room, there are no poisonous gases to dilute with fresh air, and therefore no further provision need be made, in so far as these hooded machines are concerned.

Q. My building is provided with windows on two, three or four sides. Won't windows provide proper ventilation?

A. No. The result of hundreds of air tests made by our medical inspector during the past year, indicates that windows, even when opened, will not provide adequate ventilation in all parts of a room. The air is naturally better near the windows than it is farther away, while due consideration must be given to the fact that windows are primarily designed for lighting. Every one knows that windows are generally closed tightly during cold weather, the slightest cold draft being objectionable to employees. Even though windows were used for the purpose of ventilation, the direction and velocity of the wind, changing temperature, climatic and other conditions would make such ventilation largely a matter of guesswork.

Q. Will it suffice to put a few little fans in the windows, which revolve by action of the escaping air?

A. No, such fans do little if any good. They are nothing but miniature windmills; when a current of air strikes the blades, the fan revolves. Probably as much air would pass through the opening in the window if no fan were used.

Q. Will not skylights furnish proper ventilation?

A. There is the same objection to skylights as to windows. If used for ventilating purposes they produce uncomfortable drafts of air, and we find in practically every factory that they are tightly closed, and are nothing more than the name implies—skylights.

Q. Will not the introduction of a sufficient amount of cold air lower temperature of workroom to such a degree as to be uncomfortable?

A. Possibly, and in that event it will be necessary to heat the incoming fresh air, or else supply more heat in the workroom.

Q. Where shall I place the fan—what size fan—are ducts necessary—where should fresh air be admitted or foul air removed—how much heating surface?

A. All the foregoing and other questions of similar character, are matters of detail which should be entrusted to the ventilating contractor whom you select to do your work.

Q. How am I to know that the system which I may install will be satisfactory to the Bureau of Factory Inspection?

A. We are willing to examine any plans which you may submit and if found satisfactory to approve them. Should changes appear necessary, tending toward economy or efficiency, in either installation or maintenance, you will be so advised.

Dry Air Not Essential in the Cure of Tuberculosis

Recent information has brought to light the fact that it is not the dry air in Arizona and similar sections of the country that is so beneficial in curing treatment of tuberculosis, but the climate of Arizona is beneficial for the reason that the conditions there are so little changeable. The point was brought out by Mr. J. Irvine Lyle, of the Carrier Air Conditioning Co., New York, at a recent meeting of heating engineers, when he said: "A good many physicians who are studying conditions of tuberculosis, throat and nasal diseases are taking up the theory and view that the dry air has little to do with the cure of these diseases —that it is not a question of low percentage of relative humidity, but a question of standing conditions. As a result I am informed that the cures of consumption effected on Blackwell's Island, New York, which is surrounded by water and where the percentage of humidity is high all the time, compare favorably with the results obtained in Arizona."

THE HEATING AND VENTILATING MAGAZINE

Vol. 6 April, 1909 No. 4

PUBLISHED MONTHLY AT
1123 BROADWAY, NEW YORK
BY THE
HEATING AND VENTILATING MAGAZINE CO.

President A. S. ARMAGNAC
Secretary and Treasurer, G. PETERSEN

The address of the officers is the address of this magazine.

A. S. ARMAGNAC, Editor — G. PETERSEN, Advertising Mgr.

European Representative:
AMERICAN PUBLICATION BUREAU, 46, Upingham Road, Leicester, England

Subscription,	$1.00 per year
Foreign countries,	1.50 " "
Back numbers,	15 cents a copy

Copy for new advertisements should reach us by the first of each month in order to insure insertion in that month's issue.

A PRIZE competition inaugurated by the Institution (British) of Heating and Ventilating Engineers will be watched with a good deal of interest as putting to the test the willingness or unwillingness of engineers to share their knowledge with the profession at large. The competition involves the preparation of a complete layout for a heating, ventilating and hot water supply system suitable for a hospital building, the building plans to be prepared under the direction of the Council of the Institution. Each competitor must give full description, specifications, quantities and methods of calculation. It is easy to see that a general response to the offer of the Institution would result in the unfolding of the present practice of heating and ventilating engineers that would be of the utmost value to all who had access to it.

The very fact that such a fund of information would be of such great value to almost every engineer is perhaps the strongest reason for doubting the success of the plan. It is safe to say that such a scheme proposed by the American Society of Heating and Ventilating Engineers, or by any similar body in this country, would bring but a meager response in the present condition of the profession. It might be argued that this might be said of any request for information of even an indifferent value, but in the prize competition referred to the conditions are wholly different owing to the fact that prizes of $125.00, $25.00 and $10.00, respectively, are offered for the three best schemes sent in.

A GRAVE defect in the present school ventilation laws in this country was pointed out recently in that no provision is made in these laws for the proper ventilation of old school buildings in which new heating systems are installed. The question came up in connection with the installation of a modern heating and ventilating plant in an old school building in New Jersey. The system did not meet the present ventilation requirements in that State, and an opinion was asked of the State Department of Education. The matter was officially decided by the department to the effect that there is nothing in the New Jersey ventilation law requiring old buildings to be provided with air of standard purity, even though the latest type of heating system be substituted for the one previously in use. This is so clearly a violation of the spirit of the law that it should be a comparatively easy matter to remedy, not only in New Jersey, but in the other States which have ventilation laws.

Testing and Performance of Steam Generating Apparatus

By A. Bement

So many influences have a bearing on the results of a boiler test that the subject is always one for fruitful discussion. Mr. A. Bement, of Chicago, in a recent address berore the American Institute of Chemical Engineers, called attention to some important features to be provided for in boiler tests to secure greater accuracy. At our request he has especially forwarded us the substance of his remarks:

As an early invention, the steam engine received special attention because it directly performed work, the apparatus which supplied it being considered rather of secondary importance, and devised to furnish steam required by the engine. Inasmuch as steam was produced from water by boiling, the apparatus was called a boiler, and by ordinary definition and common practice, a boiler has become to be considered a metallic structure which contains the water.

Thus an exact definition of the word boiler excludes fire bars, brick containing walls, chimney and various appurtenances required in the effective employment of a boiler. That such is the case is evidenced by the fact that many manufacturers of boilers build only this metallic structure. They contract to construct and supply what are designated as boilers and receive payment therefor, although they provide for none of the appurtenances above mentioned.

Again, many others are in the business of supplying these various accessories, who do not claim nor are they coisidered as being in the boiler business.

Notwithstanding these facts, the associated details of the problem as affecting the performance of the boiler have been largely overlooked, and it is the practice when the performance and operation of the steam generating apparatus are considered, to commonly use the expression "boiler" although reference is made to the performance of the entire apparatus of which the boiler proper is only a portion. Thus we frequently hear of "boiler" tests that are, in reality, tests of the whole device and its performance, wherein it is impossible to differentiate between the effect due to the individual characteristics of the boiler itself, and that caused by other distinct and separate influences which are entirely disassociated with it.

The method of making tests of this character consists in determining the amount of water generated into steam, which is done by measuring the quantity admitted to the boiler, applying thereto a correction, placing the evaporative performance on the basis of atmospheric pressure; also weighing the amount of coal used during the corresponding period of time, the result being expressed in units of evaporation per unit of coal used, which is obtained by dividing the equivalent pounds of water evaporated by the number of pounds of coal employed. This, briefly stated, is the main feature of the process which is almost universally employed to determine, for example, the performance of any of the following features:

1. Value of the boiler itself as to capacity and efficiency.
2. Working of a furnace or stoker.
3. Value of the coal.

Or, again, if it is desired to ascertain whether the fireman or furnace operator is a good man or not, the same method of procedure is employed; therefore, a further object of such test is to determine the

4. Skill of the fireman or furnace operator.

OTHER INFLUENCES BEARING UPON THE RESULTS

Having the above in view, a brief consideration would indicate that there must be other influences bearing upon the results, of equal importance to the individuality of the boiler, which suggests the desirability of

ascertaining the measure of these different influences. In addition, it is advisable in making reference thereto, that some new and adequate terms be devised and adopted, that there may be intelligent differentiation made between the influence due to the component parts of the steam generating apparatus, because it will no longer be feasible to use the word "boiler" as applying to these several distinct and separate, although associated features.

In the early experience of the testing of "boilers" (steam generating apparatus), when the problem was not so fully understood as at present, experience frequently showed when a test was repeated under supposedly the same conditions, that the results differed, in consequence of which an effort was made to eliminate supposed errors of measurement and observation. This led to the practice of removing all of the fire and starting it anew with wood and coal which had been previously weighed.* This custom, however, was indulged in before it was realized that the condition of combustion, or in other words, the quality of the fire† was a matter of much importance.

Thus the disposition was, while overlooking the chemical features of the problem, to insist upon the exercise of greater care as affecting the physical characteristics, but notwithstanding such precautions, results were no more concordant than before, and there has been a growing desire among mechanical engineers who have thus far dealt with the problem of boiler performance, to attack it in detail.

It is, however, a fact, that the one phase of boiler performance, interposing probably the greatest difficulty for engineers, is that of combustion, which is a chemical rather than a mechanical process, and owing to this fact the efforts of engineers have been hampered. Thus it appears that the general problem is a more complicated one than was formerly considered, and it may be that the following will assist to a better understanding of the detailed features involved.

Only a brief consideration is necessary, for it to be realized that the office of the boiler is to abstract heat from hot gases flowing over it; hence a boiler, able to abstract a greater proportion of heat from gases of the same character and composition, must necessarily be looked upon as the more efficient boiler. In tests, however, it would be impossible to definitely determine which of the two boilers would be the more efficient, unless each were served with a combustion gas identical in character and composition, because while the boilers might be precisely the same, a difference in the condition of combustion in itself, would result in a higher or lower efficiency in steam generation.

Thus studying the matter progressively, commencing with our present viewpoint, it is desirable that if values are to be expressed in some term of "efficiency," the beginning must be made with the boiler itself, and when its own efficiency, strictly from the standpoint of its own individuality has been located, it will be feasible to take up other steps in the consideration. It is a fact that there is as much variation in efficiency in steam generation, due either to the working of a stoker machine, the character of the fuel, or the skill or ability of a fireman or furnace operator, as to the boiler itself. Therefore these features are of equal economic importance to that of the boiler performance, and it is as desirable to have some means for measurement of their value as it is of the boiler proper.

The next step is that of combustion, and if complete combustion of all of the fuel which does not fall into the ash pit occurred with no air in excess, the performance would be ideal, and the condition could be referred to as giving efficiency of combustion of 100%. It must be observed that this implies that a maxi-

*Trans. American Society of Mechanical Engineers, Vol. XXI, p. 34.

†Proceedings National Electric Light Assn., 1903, p. 196.

mum temperature has been generated, as would necessarily follow, as there would be no air in excess, thus any definition of efficiency of combustion must take into account initial temperature.* It would not be sufficient that there were no carbon monoxide or hydrocarbons present in the combustion gases for the ideal condition to be obtained, because combustion could be complete if accompanied by very large excess of air, but the initial temperature should be so low, that the heat in the gases would be very largely wasted in the chimney.

Thus the office of the gases is to heat something, and to heat it to advantage they must be hot, and it should not be lost sight of, that the hotter they are the more heat will be delivered. This individual branch of the subject should be considered as a combustion performance rather than the performance of a furnace, because it is found that the shapes of setting walls, combustion chambers, etc., exercise an influence, and it would be desirable to understand this and apply a measure of value.

For example, if a fire discharges its gases into a chamber, which is sufficiently long to insure that combustion be completed before the exit of the gases, its performance could be referred to as having an efficiency of 100%, but if of shorter length and combustion unfinished, its efficiency would be proportionately less.

The next step leads to the consideration of the stoker or fire grate, and the problem becomes more complicated. Thus an ideal stoker would be one introducing the fuel in such manner that there would be an equal mixture between products of combustion and entering air for all portions of the fire, and at the same time not allow unburned coal to fall through into the ash pit below. This would require a replenishment of the fire by depositing fuel equally over its entire surface, something which in best service is impracticable for three reasons:

1. That it is difficult to so distribute the fuel.

2. Under this condition, volatilization would occur equally over all portions of the fire, which would necessitate a correspondingly larger combustion chamber.

3. With such method of feed, the removal of ash would have to occur at the bottom of the fire, which would be impossible without it being accompanied by the disturbance of the entire fuel bed.

Therefore the best result is obtained by the admittance of fresh fuel at a uniform rate at one end of the stoker fire bars, and at the same time, discharge of ash at the other end. Thus the volatilization occurs at one side of the fire, from which portion smoke making gas will enter the combustion chamber, where the completion of the combustion process should occur, therefore it appears that the duties of the stoker are to produce uniformity in supply of fresh fuel, maintenance of the fuel bed, proper and adequate discharge of the ash, and that there shall be an absence of air leaks through the frames or other parts of the stoker machine. The ability of the stoker to perform these offices is the measure of its efficiency, and it is of no consequence whether smoke making gases are discharged by it or not, because it is the office of the combustion chamber to finish their combustion.

But it is often found that a different character of fire is produced with the same stoker, due to variation in quality of the fuel.† Therefore it is necessary to go a step further, and take into consideration another influence which has a most significant bearing on the problem, although one entirely disassociated with any characteristic of the apparatus itself, because if the best character of apparatus be served with the poorest kind of coal, the final result will be a correspondingly poor one, while on the other hand, it is possible to attain a righer result in steam generation if an inferior apparatus be served with

*Trans. American Society of Mechanical Engineers, Vol. XXVI, p. 643.

†Journal Western Society of Engineers, Vol. XI, p. 529.

the best coal. Likewise, if the furnace operators or firemen are careless or unskilled, they may influence the result in a manner equal to that due to variation in the charaacter of the fuel itself, through such causes as failure to clean the fire, maintain a sufficiently thick fuel bed, or allow the fire bars of the stoker to become uncovered, etc. Thus it is apparent that there art two classes of influences bearing upon the final result:

1. Of the apparatus itself.
2. The fuel and manipulation of the fire.

Thus enumerated the characteristics of the apparatus as a whole is as follows:

1. The boiler.
2. Process of combustion.
3. Performance of furnace.
4. Action of stoker.

It is assumed, of course, that setting walls, etc., would be carefully built so as to eliminate the necessity for consideration of air leaks or radiation therefrom, although these are problems of sufficient importance in themselves to require adequate attention. While on the other hand, the influences which are no part of the apparatus itself, but have an equal effect in the final result, are enumerated as:

1. The characteristics of the fuel.
2. The result of skillful or unskillful manipulation of the fire.

It therefore follows that the proper measurement of the efficiency at any stage of the process must not be vitiated by variables introduced from elsewhere.

Information for Exporters and Importers

Aid to Shippers is the title of a 72-page book containing a quantity of information of value to all engaged in the export or import trade. The book is issued by Delrichs & Co., of New York, for forty years the American representatives of the North German Lloyd Steamship Company. The table of foreign moneys with United States equivalents together with weights, measurements, tariffs, customs requirements, etc., etc., will be found of great value. We understand that "Aids to Shippers" will be sent, postpaid, on request to Oelrichs & Co., Forwarding Department, 5 Greenwich street, New York.

Ventilation of Pennsylvania Railroad's New Passenger Cars

Details of the ventilating features of the 200 all steel coaches ordered by the Pennsylvania railroad have been sent us by Mr. Ivy L. Lee, of the general office in Philadelphia.

"The coaches," he says, "will be equipped with a ventilating system by which, with all windows and doors closed, each passenger will be supplied with 1,000 cu. ft. of fresh air per hour, which is equivalent to a complete change of air in the car every 4 min. The comparatively small volume of air in a coach, and the large number of passengers carried, renders the ventilating problem particularly difficult. To change the air completely every 4 min. without producing draughts of any kind is a problem in itself, and it is made more difficult by the fact that in cold weather all of this air must be thoroughly warmed before it enters the car. The system employed was developed after careful experiments covering a period of years and has been successfully used in over 1,000 wooden cars.

"Air is taken in by two hoods situated on diagonally opposite corners of the car roof. From each hood a vertical duct leads down, within the side of the car, to a horizontal duct which runs the entire length of the car between the floor and the sub-floor next to the side sill. Above the floor of the car, and running its entire length along the sides, are rectangular ducts containing the steam heating pipes. Air entering the hood passes down to the duct beneath floor and along this to openings into the duct containing the heating pipes. After circulating about the heating pipes and becoming thoroughly warmed it is delivered into the aisle of the car through tubular outlets beneath each seat.

"Air is discharged from the car through ventilators in the roof, which are provided with valves to limit the amount of air passing. Movement of the car forces the air into the car under slight pressure; limiting the discharge maintains the pressure and prevents the entrance of cold air through cracks about the doors and windows. The ventilation system works equally well in either winter or summer, but the warming of so much fresh air requires considerably more steam than would be needed by the usual methods of heating without much if any ventilation.

"In suburban cars heated by electricity, it will be impractical to supply sufficient heat to warm the great volume of air required for ventilation, and these cars will, therefore, be ventilated in the usual way, by opening windows or ventilating sash on the roof. As passengers in this class of service usually make trips of comparatively short duration, the means of ventilation supplied will doubtless prove satisfactory."

State Control of Heating and Ventilating Engineers

One of the topics for discussion at the recent annual meeting of The American Society of Heating and Ventilating Engineers was the question of State control for heating and ventilating engineers. The topic brought out the following animated discussion:

MR. W. M. MACKAY: As doctors, druggists, veterinary surgeons and chiropodists are put under restrictions, it is possibly right for the society to move in the matter of state control for heating and ventilating engineers, the idea being that a competent heating and ventilating engineer should be protected in his specialty, as are those in other professions, and that the incompetent be prevented from bringing discredit on the profession, as we probably all have seen it from time to time.

MR. BADGER: I am in favor of State control of heating and ventilating engineers for the reason that in bidding to secure contracts ignorance in the matter is of great disadvantage, not only to ourselves but to our clients. If State control could be obtained to the extent, at least, that the title of heating and ventilating engineer could only be used after passing a proper examination, it would help to impress upon our clients the importance of entrusting this work to men of experience and ability, and would eliminate to a great extent the difficulties we have to arouse interest in the proper application of our business.

PROF. KINEALY: I am opposed to State control. It seems to me it would be difficult to establish a standard unless it be the standard we have already established in this society. If you have State control, you must have some standard. The man who applies for his license must be known to some one as a man competent to design and install heating and ventilating plants. That means he must have the qualifications for membership in this society, so if we have State control we must practically have a law to the effect that in order to practice in the State an engineer must be a member of this society. Is it not far better for us to make our society such that the public will know that a man who is a member of it is fully competent? Let us impress that upon the people and we will need no law.

No man could undertake to pose before the public as a mechanical engineer and undertake the designing, superintending and construction of large work, unless he was a member of the Society of Mechanical Engineers. So I think that no man who does not possess the qualifications for membership in this Society could pose as a heating and ventilating engineer.

I have been very careful to say "possess the qualifications." I do not mean that a heating and ventilating engineer must necessarily be a member of this society. There are many heating engineers who possess all the qualifications who are not members. The mere fact that a man is a member will mean to the public that that man has been looked over, his qualifications studied, and he has been passed upon and voted for by several hundred men who know he is a competent engineer and is honest, reliable and trustworthy.

Prize Competition in Designing Heating and Ventilating System for a Hospital

An interesting competition has been inaugurated by the Institution (British) of Heating and Ventilating Engineers along somewhat novel lines. The competition involves the preparation of a complete set of heating, ventilating and hot water supply plans for a system suitable for a hospital building as shown, outline plans prepared under the direction of the council. Each competitor is to give full description, specification, quantities and method of calculation, and all schemes are to be submitted under a nom-de-plume.

The especially valuable feature of the competition, as far as the Institution is concerned, is in connection with the condition that the schemes submitted will become the property of the Institution and that the council will have the option of publishing some or all of the schemes at their discretion.

The competition is open to British engineers only.

The proposed installations are to be clearly shown in colored inks on the council's plans, together with the sizes of pipes, radiation surface fitted in each room, capacities of cylinders, expansion and cold supply tanks, boilers, etc. The competitor may, if he prefers, make cloth tracings of the plans, or paper drawings to illustrate his scheme, or supplementary drawings or tracings to show more fully his proposals. The competitor must also prepare among other things:

1. A short but clear description of each installation, stating his reasons for their adoption.

2. Full specifications for the warming, ventilating and hot water supply installations.

3. Priced quantities of material and labor, showing how the estimated costs of each installation are figured.

4. The tender price for each installation.

5. A summary of all the calculations necessary to arrive at

(a) The heat losses in the different rooms of the buildings.

(b) The radiation required to be fitted in each room.

(c) Sizes of pipe-mains, risers and radiator connections.

(d) Power of boiler.

(e) Ratio between effective and non-effective heating surface of mains and risers.

6. Estimated fuel consumption of boiler when apparatus is working under the specified conditions and when working under varying conditions of outside temperatures, say for 32°, 35°, 40°, 45°, 50° F. respectively.

7. Sizes and capacities of hot-water circulating cylinders, feed tank, and of all hot-water circulation mains, risers and supply pipes between mains and draw-offs, size of boiler, and how the proportions of foregoing are determined.

8. Boiler power fitted in both systems (a) as rated in cataloge, (b) probable actual working of boiler, (c) maximum working power required to fulfil the specified working conditions, (d) ratio of maximum actual power of boiler to work required by installation.

9. Any other calculations considered necessary to arrive at an efficiently proportioned and practical apparatus.

10. Each competitor will be expected to provide a scheme of ventilation, to prepare specification giving sizes of air ducts, inlets and full particulars, including the changes of air per hour in the various rooms.

11. Amount of, and estimated cost of, builders' work required to carry out the schemes and for providing the necessary tank platforms, air inlets, ducts, etc.

12. A deposit of $20.00 accompany each application for plans, which will be returned upon the receipt of schemes and plans.

Tariff Commission Convention

At the recent Tariff Commission convention, held in Indianapolis, Ind., February 16-18 last, the agitation for a permanent, non-partisan, semi-judicial tariff commission took definite form in the passage of the following resolution:

We demand from Congress, for the equal benefit of all classes of the people, and in the name of all American industry, of farm, factory, labor and commerce, represented in the National Tariff Commission Convention, held at Indianapolis, consisting of delegates from 42 States and representing 223 agricultural, civic, commercial and industrial bodies, the immediate creation of a permanent tariff commission for the following purposes and ends through Congressional action:

1. The collecting and intelligent, thorough and unprejudiced study of tariff facts.

2. The development and enlargement of our foreign trade.

3. The accomplishment of this by reciprocal trade agreements based on maximum and minimum schedules.

4. The adjustment of the tariff schedules so that they shall affect all interests equitably.

5. The fixing of the rates of duty to be paid on the imports from any foreign country within the limits of the maximum and minimum rates established by Congress under reciprocal trade agreements negotiated by or under the direction of the President, in order thereby to develop and protect our foreign trade by the means favored by President McKinley, and authorized by sections 3 and 4 of the Dingley law.

The convention declared for a minimum of delay in the forthcoming revision of the tariff and organized permanently by electing as chairman James W. Van Cleave, of St. Louis, president of the Manufacturer's Association, and authorizing him to appoint a committee of 100.

CORRESPONDENCE

Standard Rating for House Heating Boilers

EDITOR HEATING AND VENTILATING MAGAZINE:

The following correspondence may be of interest to your readers as a further discussion of the rating of house heating boilers. PERCIVAL H. SEWARD.

New York, April 3, 1909.

Mr. Percival H. Seward,
76 Centre St., New York.

We note with interest your report at the last meeting of the American Society of Heating and Ventilating Engineers regarding the rating of house heating boilers. We note also that this basis for computing capacity has been recommended to the society and may be adopted. The writer has taken a great interest in all the controversy which has been going on for the past two years, as it directly affects the business in which he is engaged. Having read Professor Kent's paper very thoroughly on the same subject, the writer is unable to figure out from the formula which you give the capacity of the boilers the same as given by Professor Kent. For instance, the formula for small boilers, as given in your table, is G × 5 × E equals

B. T. U. per hour. The E being an unknown quantity, you give a formula to obtain this E, but it is not clear to the writer how you obtain the same. If not asking too much, we wish you would figure the four sizes which we are enclosing, taken from the manufacturer's tables, and give us the rated capacity according to your formula and how you figure it.

	Boiler Heating Surface.	Radiator Surface.
1. Boiler grate 2.1 sq. ft..	45	210
2. Boiler grate 4.7 sq. ft..	90	600
3. Boiler grate 8.2 sq. ft..	195	1,500
4. Boiler grate 14.0 sq. ft..	420	2,300

Thanking you very kindly for this information, knowing the good that will be derived from this educational campaign which the society is making, I remain,

Yours very truly,

Columbus, O. M. L. FOOTE.

MR. SEWARD'S REPLY

Mr. M. L. Foote,
Care Scioto Valley Supply Co., Columbus, Ohio.

Replying to your letter of Feb. 22d about boiler ratings, would say that the factor of efficiency (E) should be supplied by the maker of the boiler in order that a rating can be made on the basis of the proposed standard, as outlined in the paper you refer to.

For a rating as published at this time and in connection with which efficiency is not stated, the same can be determined as explained in paper, if the proposed standard of coal consumption is accepted as a factor.

The boilers you mention in your letter show varying efficiency on this basis of coal consumption, and it is, therefore, probable that some other method must have been used in arriving at the rating.

The amount of heating surface is not a factor, as it is unsafe to assume a fixed arbitrary efficiency for all boilers. An evaporative test is the only method by which the power of a cast iron heating boiler can be determined, and this explains the difference between Professor Kent's suggestion and the one which I proposed.

I will attach hereto data relating to boilers mentioned in your letter, from which it would appear that the boilers in question must be very inefficient or they are rated for a lower rate of combustion than provided for in the proposed standard.

The calculations are based on the value of coal (14,400 B. T. U. per lb.) and the rate of transmission from radiators (250 B. T. U. per sq. ft.) as given in proposed standard, therefore, B. T. U., as rated, divided by coal available (G × C) equals the efficiency per pound of coal, and the relation of said efficiency to the full value (14,400 B. T. U.) equals the percentage of efficiency. PERCIVAL H. SEWARD.

Boiler	No. 1.	No. 2.	No. 3.	No. 4.
Grate Area, sq. ft.	2.1	4.7	8.2	14.0
Rate of Combustion, lbs.	5.	5.	5.7	6.6
Coal per hour, lbs.	10.5	23.5	46.74	92.4
B. T. U. available.	151,200.	338,400.	672,480.	1,330,560.
B. T. U. as rated	52,500.	150,000.	375,000.	575,000.
B. T. U. efficiency per lb. coal.	5,000.	6,383.	8,023.	6,223.
Efficiency, per cent.	34.7	44.3	55.8	43.2
Steam Rating	210.	600.	1,500.	2,300.
Rating 1 sq. in. Grate	.70	.88	1,27	1.15

Current Heating and Ventilating Literature

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

BOILER DESIGN

Computing Boiler Power. Charles L. Hubbard. Gives simple methods for calculating the size of boilers. 1,800 w. Elec. Age—Feb., 1909. 20c.

BOILER TESTING

Recent Refinements in Boiler Testing. Albert A. Cary. Illustrated descriptions of apparatus and methods employed. 5,500 w. Power—Feb. 23, 1909. 20c.

POWER PLANTS

Power Plant of the Heath & Milligan Paint Works, Chicago. Illustrated description of a central plant for furnishing heat, light and power to various buildings. 2,500 w. Eng. Rec.—Feb. 20, 1909. 20c.

Power Plant of the Hoboken Passenger Terminal of the Lackawanna Railroad. Plans and description of the new central station for supplying light, heat and power to this terminal. 3,000 w. Eng. Rec.—Feb. 13, 1909. 20c.

PIPING

High Pressure Steam Piping Systems. William F. Fischer. Notes on recent design, including a discussion of expansion, vibration, pipe and pipe fittings, etc. 4,000 w. Power—Feb. 23, 1909. 20c.

SHIP HEATING

The Heating of Modern Ocean Liners.

W. Carlile Wallace. From a paper read before the Inst. of Naval Archts. Discussion of systems used on a number of vessels, cost, etc. 3,500 w. Int. Marine Engng.—Feb., 1909. 40c.

Piping Up a Merchant Vessel for Steam Heat. Allan Dale. 3,000 w. Int. Marine Engng.—Feb., 1909. 40c.

The Weather for March

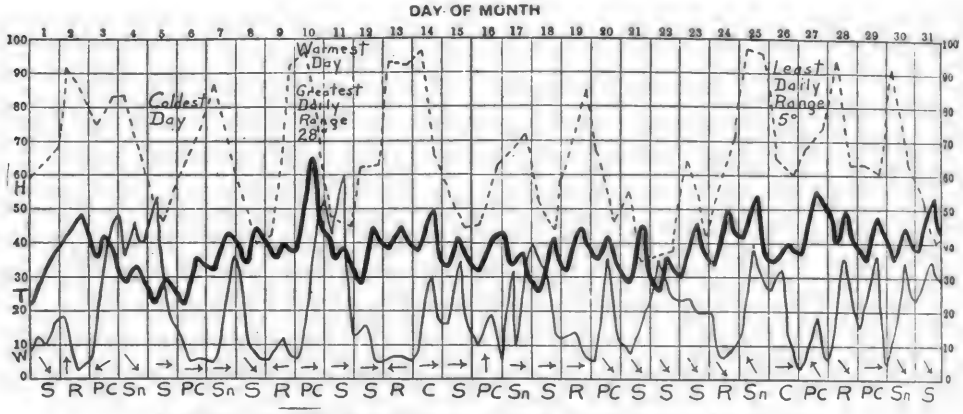
March temperatures were more nearly normal than those of any of the preceding months during the winter of 1908-1909. In New York and St. Louis the average of the weather conditions were absolutely normal, while in the other large cities the variations from the average mean temperatures for the month were very slight.

NEW YORK

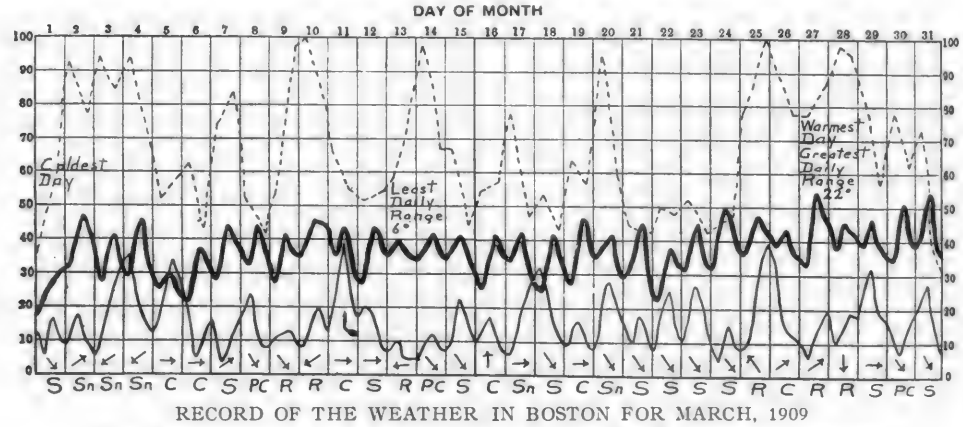
Highest temperature, 66°, on the 10th; lowest temperature, 21°, on the 5th; greatest daily range, 28°, on the 10th; least daily range, 5°, on the 26th. Mean temperature for the month, 38°, corresponding to the mean temperature of this month for 39 years. Total precipitation, 3.19 in.; snowfall, 4.1 in.; no snow on ground at end of month. The average precipitation of this month for 39 years is 4.01 in. Prevailing direction of wind, west; total movement, 12,344 miles; average hourly velocity, 16.6 miles. 12 days clear, 10 partly cloudy, 9 cloudy. Rain or snow fell on 11 days.

BOSTON

Highest temperature, 55°, on the 27th; lowest temperature, 17°, on the 1st; greatest daily range, 22°, on the 27th; least daily range, 6°, on the 13th. Mean temperature for the month, 37°, 2° above the mean of this month for 39 years. Total precipitation, 3.28 in., about ¾ in. less than usual; total snowfall, 3.1 in.; no snow on ground at end of month.


DAY OF MONTH
Warmest Day
Greatest Daily Range 28°
Coldest Day
Least Daily Range 5°
H
T
W
S R PC Sn S PC Sn S R PC S S R C S PC Sn S R PC S S S R Sn C PC R PC Sn S

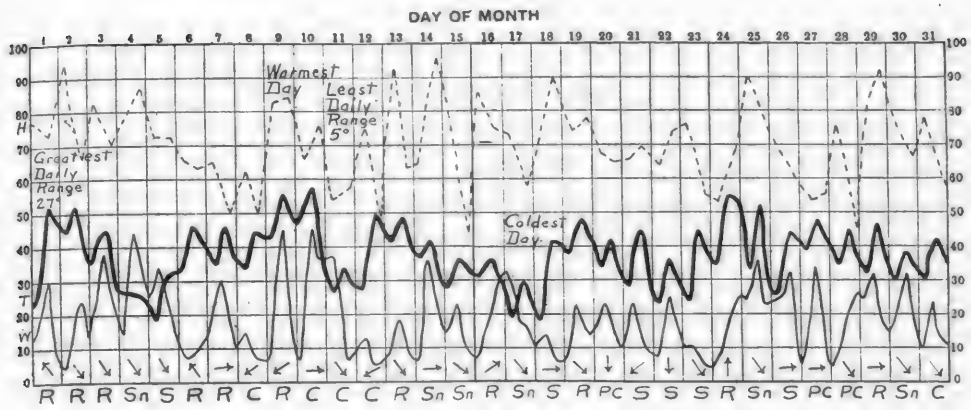
RECORD OF THE WEATHER IN NEW YORK FOR MARCH, 1909.


DAY OF MONTH
Coldest Day
Least Daily Range 6°
Warmest Day
Greatest Daily Range 22°
S Sn Sn Sn C C S PC R R C S R PC S C Sn S C Sn S S S S R C R R S PC S

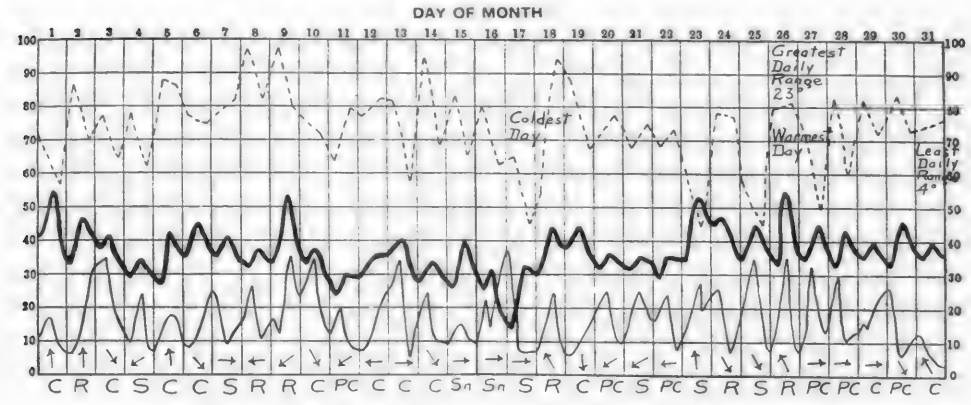
RECORD OF THE WEATHER IN BOSTON FOR MARCH, 1909

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau.

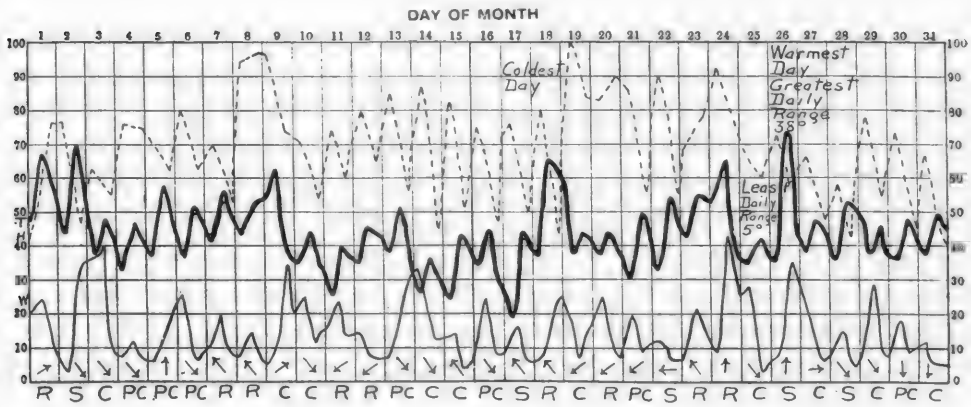
Upper line indicates temperature in degrees Fahr.
Broken lines indicates relative humidity in percentage from readings taken at 8 a. m. and 8 p. m.
Lower line indicates velocity of wind in miles per hour.
Arrows fly with prevailing direction of wind.
S—Clear. PC—Partly Cloudy. C—Cloudy. R—Rain. Sn—Snow.


DAY OF MONTH
Warmest Day
Least Daily Range 5°
Greatest Daily Range 27°
Coldest Day
H
T
W
R R R Sn S R R C R C C C R Sn Sn R Sn S R Pc S S S R Sn S Pc Pc R Sn C

RECORD OF THE WEATHER IN PITTSBURG FOR MARCH, 1909


DAY OF MONTH
Greatest Daily Range 23°
Coldest Day
Warmest Day
Least Daily Range 4°
C R C S C C S R R C Pc C C C Sn Sn S R C Pc S Pc S R S R Pc Pc C Pc C

RECORD OF THE WEATHER IN CHICAGO FOR MARCH, 1909


DAY OF MONTH
Coldest Day
Warmest Day
Greatest Daily Range 38°
Least Daily Range 5°
R S C Pc Pc Pc R R C C R R Pc C C Pc S R C R Pc S R R C S C S C Pc C

RECORD OF THE WEATHER IN ST. LOUIS FOR MARCH, 1909

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE, by the United States Weather Bureau

Upper line indicates temperature in degrees Fahr.
Broken lines indicates relative humidity in percentage from readings taken at 8 a. m. and 8 p. m.
Lower line indicates velocity ot wind in miles per hour.
Arrows fly with prevailing direction of wind.
S—Clear. PC—Partly Cloudy. C—Cloudy. R—Rain. Sn—Snow.

Prevailing direction of wind, northwest; total movement, 9,410 miles; average hourly velocity, 12.7 miles. 12 clear days, 5 party cloudy and 14 cloudy. Rain or snow fell on 12 days.

PITTSBURG

Highest temperature, 65°, on the 9th; lowest temperature, 19°, on the 18th; greatest daily range, 27°, on the 1st; least daily range, 5°, on the 11th. Mean temperature for the month, 37°, 3° below the mean of this month for 39 years. Total precipitation, 3.14 in., close to the average; snowfall, 3.9 in.; no snow on ground at end of month. Prevailing direction of wind, northwest; total movement, 9,750 miles; average hourly velocity, 13.1 miles. 7 clear days, 8 partly cloudy and 16 cloudy. Rain or snow fell on 17 days.

CHICAGO

Highest temperature, 55°, on the 26th; lowest temperature, 14°, on the 17th; greatest daily range, 23°, on the 26th; least daily range, 4°, on the 31st. Mean temperature for the month, 36°, 1° above the mean of this month for 39 years. Total precipitation, 1.63 in., nearly 1 in. less than usual; snowfall, 3.8 in.; no snow on ground at end of month. Prevailing direction of wind, west; total movement, 10,828 miles; average hourly velocity, 15 miles. 6 clear days, 8 partly cloudy, 17 cloudy. Rain or snow fell on 8 days.

ST. LOUIS

Highest temperature, 73°, on the 26th; lowest temperature, 19°, on the 17th; greatest daily range, 38°, on the 26th; least daily range, 5°, on the 25th. Mean temperature for the month, 44°, corresponding to the mean of this month for 36 years. Total precipitation, 3.69 in., about ¼ in. more than usual; snowfall, 0.1 in.; no snow on ground at end of month. Prevailing direction of wind, northwest; total movement, 8,883 miles; average hourly velocity, 11.9 miles. 5 clear days, 8 partly cloudy, 18 cloudy. Rain or snow fell on 9 days.

Society Committees for 1909-1910

Following is the full list of committees of the American Society of Heating and Ventilating Engineers for 1909-1910, as announced by President William G. Snow:

COMPULSORY LEGISLATION

John F. Hale, Chairman.
George Hehring.
H. D. Crane.
Bert C. Davis.
Fred R. Still.

STANDARDS

J. H. Kinealy, Chairman.
P. H. Seward.
Edw. D. Densmore.
H. A. Smith.
W. L. Bronaugh.

TESTS

J. D. Hoffman, Chairman.
Chas. R. Bishop.
Theo. Weinshank.
Cesar Teran.
R. A. Widdicombe.

STATE LEGISLATION FOR NEW YORK

B. S. Harrison, Chairman.
Frank K. Chew.
R. C. Carpenter.
Wm. C. Vrooman.
W. M. Mackay, Secretary.
Assisted by E. P. Bates and C. W. Old.

FAN BLAST DATA

Wm. G. Snow, Chairman.
R. C. Carpenter.
J. H. Kinealy.
F. R. Still.
J. H. Brady.

DATA ON AIR WASHERS

S. R. Lewis, Chairman.
Bert C. Davis.
Thomas Barwick.
R. P. Bolton.
B. S. Harrison.

DATA ON SURFACES IN HEATING BOILERS

J. H. Kinealy, Chairman.
J. R. Allen.
A. B. Franklin.
W. M. Mackay.
P. H. Seward.

RELATIVE CORROSION OF WROUGHT IRON AND STEEL PIPE

T. N. Thomson, Chairman.
Thomas Barwick.
Frank N. Speller.

REVIEW COMMITTEES FOR 1910

Furnace Heating—J. D. Hoffman.
Hot Water Heating—W. M. Mackay.
Steam Heating (not including central plants)—Large buildings, John F. Hale; residences and small buildings, Chas. F. Newport.
Electric Heating—T. N. Thomson.
Heating Boilers—P. H. Seward.
Radiators and Heaters—W. W. Macon.
Central Heating Plants—J. R. Allen.
Ventilation in General—Thomas Barwick.
Compulsory Legislation—John F. Hale.
Tests—D. D. Kimball.
Standards—R. C. Carpenter.
Fans and Fan Systems—B. S. Harrison.

Congress of German Engineers

The Heating and Ventilating Congress of German engineers will be held June 9 and 10, 1909, at Frankfurt-on-Main, Germany.

NATIONAL ASSOCIATION OF MASTER STEAM AND HOT WATER FITTERS

Annual Convention to Be Held at Niagara Falls, June 14-17, 1909

Announcement is made by the National Association of Master Steam and Hot Water Fitters that the 21st annual convention of the association will be held at Niagara Falls, June 14-17, 1909. Headquarters will be at the International Hotel, which is on the American side of the falls, only a minute's walk from the brink of the precipice.

French Association of Heating and Ventilating Engineers

"Association Amicale des Ingénieurs de Chauffage et Ventilation de France" is the name of a new organization, formed December 6 last, in Paris. The society will be conducted on lines similar to those of the American Society of Heating and Ventilating Engineers and will also serve as an employment bureau for its members. The following officers have been elected: President, A. Nillus, technical editor of Chauffage et Industries Sanitaires; vice-president, G. Debesson; treasurer, A. Gobley; secretary, E. Lavent, Rivory et Joly, 8 Rue Belgrand, Paris. The title of general honorary secretary was conferred on E. d'Esménard for his efforts in the way of organizing the society. Chauffage et Industries, a monthly journal devoted to heating and ventilation, has been named as the official organ of the association.

A general meeting is scheduled for April of each year.

New Books

"Heat for Engineers" is the title of a new treatise on heat with special regard to its practical applications, written by Charles R. Darling. The author, who is a well recognized authority on this subject, is the Lecturer in Heat at Finsbury Technical College, England. The contents of chapters are as follows:

1. Heat as a form of energy. Units. 2. Methods of producing heat. The properties, uses and evaluation of fuels. 3. Specific heat. 4. Expansion. 5. Practical application of the property of expansion. 6. Atmospheric pressure. General properties of gases. 7. The measurement of temperature. Liquid and gas thermometers. 8. The measurement of high temperatures. Pyrometry. 9. Change of state. Fusion. 10. Practical applications of fusion and allied phenomena. 11. Vapors. 12. Ebullition. 13. Laton heat of vaporization. Properties of steam. 14. Atmospheric moisture. Hygrometry. 15. The production of low temperatures. Liquefaction of gases. 16. Refrigerating machinery. Ice manufacture, and cold storage. 17. The transfer of heat. Conduction. 18. The transfer of heat. Convection. 19. The transfer of heat. Radiation. 20. The Conversion of heat into work. Laws of thermodynamics. 21. The conversion of heat into work. Practical heat engines. Tables, index. 442 pages, 110 illustrations, 8vo., cloth. Price, $5.00. The book may be procured from THE HEATING AND VENTILATING MAGAZINE on receipt of price.

Two Family and Twin Houses is a new book containing a variety of designs contributed by 25 leading architects in all parts of the country, showing the latest ideas in planning this class of dwellings in city, village and suburb, together with descriptions covering the latest improvements in sanitation, heating, lighting, etc., included in the contents are two detailed specifications and sixty designs, illustrated in many cases, by exterior views in half-tone. Size, 8x9½ in. pp. 127. Published by William T. Comstock, 23 Warren street, New York. $2.00.

Trade Literature

Nelson Valves is the title of a newly-issued catalogue published by the Nelson Valve Company, Philadelphia, Pa., bound in cloth and containing 220 pages, 6 x 9 in. (standard). It is a book calculated to arouse the admiration of the engineer, for it not only contains profusely illustrated descriptions of the company's product, including, globe, angle, gate and check valves, but in its form and get up it will be welcomed by those who desire to have their libraries of trade literature in a presentable as well as handy form. The book, for the term of catalogue hardly describes its character, is divided into three sections, Section 1 being devoted

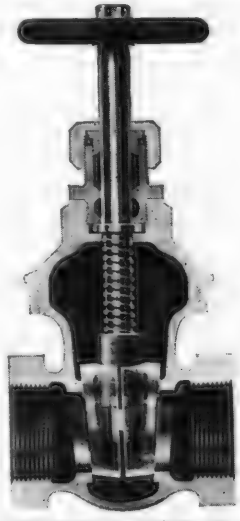


FIG. 1.—SECTIONAL VIEW OF NELSON BRONZE GATE VALVE, SCREWED ENDS

to bronze valves, Section 2 to iron body and steel valves and Section 3 to accessories and fittings. Included in the catalogue are full dimensions and price lists.

One of the most interesting products of the company are its gate valves, including the single, solid, tapered wedge type, the double parallel disc type and the double disc taper seat type. A sectional view of one of these valves is shown

FIG. 2—EXTRA HEAVY NELSON BRONZE GATE VALVE, SCREWED ENDS

in Fig 1, while Fig. 2, shows a type of extra heavy bronze gate valve, with screwed ends.

We are advised that a copy of "Nelson Valves" will be sent to any of our readers by mentioning THE HEATING AND VENTILATING MAGAZINE.

A New Book on Humidity, Air Purifying and Cleansing

One of the most complete and instructive text books on the subject of "Humidity, Air Purifying and Cleansing" that has come to our notice is the illustrated catalog which is being sent out by the Carrier Air Conditioning Co. of America, 39 Cortlandt street, New York.

The book, which is bound in a handsome dark green cover, consists really of three parts. The first is devoted to the construction and detail description of the Carrier air washing and humidifying apparatus.

The second section is a very complete analysis of the laws governing humidity treated in a complete manner but with all the technical terms so defined that it is equally instructive to the engineer and layman. The definition of such terms as dry bulb, wet bulb and dew points and their relation to each other are made plain.

The third section deals with the practical application and requirements of a successful air purifying and humidifying system applied to a variety of public, office, and industrial buildings.

The book contains very complete and convenient hygrometric tables. It will be sent upon request to any one interested in the subject.

Minneapolis Heat Regulator and Time Attachment for controlling drafts of fires is a booklet of 20 pages, illustrated, describing this interesting device, manufactured by the Electric Heat Regulator Co., Minneapolis, Minn.

Wyckoff Steam Pipe Covering, a booklet of 20 pages, contains a condensed description, with illustrations, of the insulating materials made by A. Wyckoff & Son Co., Elmira, N. Y. Included in the booklet is the record of a test made by Prof. R. C. Carpenter, showing comparative losses in the transmission of heat as between naked pipe, pipe covered with solid wood and earth, and pipe covered with the Wyckoff covering.

Economic Ventilating, a leaflet published by the Ilg Electric Ventilating Co., Chicago and New York, shows an illustration of the manner in which air is drawn through the ventilating pipe, thus cooling the motor. A large list is given of representative concerns who are using the Ilg electric ventilating fans, and under the heading "A Few Facts" are presented figures showing the cost of operating several large exhaust fans of the same size obtained from different manufacturers, which make a remarkable showing in favor of the Ilg self-cooled fan.

"Ventilation by the Garner System," published by the Garner Ventilating Co., 136 Liberty street, New York, describes and illustrates, in booket form, the mechanical ventilator sold by this firm. The device is applied to the window and is operated by an electric cord attached to an ordinary incandescent lamp. The fresh air is drawn in and discharged from the device by means of a positive pressure fan of the centrifugal type and the device is also provided with means for tempering and filtering the air during the winter season. The fan is driven by an almost noiseless electric motor. The apparatus measures 30 in. x 30 in. x 47 in.

"Why the Jewell?" is a folder, published by the Jewell Mfg. Co., Auburn, N. Y., stating that the Jewell is the original time clock thermostat and is so arranged that the indicated temperature may be raised through any range between 50° and 90° F. The folder contains colored photographic illustrations of the device, including the motor.

Pure Air, a booklet issued by the Pullman Automatic Ventilator Co., 180

Broadway, New York, contains some graphic illustrations of the way a closed room and an open window are equally baneful in their effects upon the comfort and health of the occupants and illustrating, by way of contrast, the course taken by the air when windows are equipped with Pullman ventilators.

Our New Product is the title of a 16-page catalogue, 6 x 10 in., published by the B. F. Sturtevant Co., Hyde Park, Mass., illustrating and describing Sturtevant multivane fans, also Sturtevant steel plate, electric, steam and turbine fans, mine fans, hot blast apparatus, economizers, waste heat air heaters, propeller fans, dust collectors, forges, high pressure blowers and exhausters and blast gates.

Recent Installations of Kinnear Pressed Radiators are listed in a folder published by the Pressed Radiator Company of America, Pittsburg, Pa., showing the gratifying patronage that is being accorded this interesting form of heating surface.

Anderson Cushioned Automatic Non-Return and Triple Acting Valves for the protection of the power station, are brought to the attention of the trade in a recent circular issued by the Golden-Anderson Valve Specialty Co., Pittsburg, Pa.

Webster System of Steam Circulation is the subject of a handsomely gotten-up booklet of 12 pages containing a description of the many advantageous features of this method of heating. Included in the booklet are well-executed photographic reproductions of some of the more important recent buildings in which the Webster System is installed, including the City Investing building, New York; U. S. Mint, Philadelphia; Michael Reese Hospital, Chicago; U. S. Patent Office, Washington; State Capitol, Denver; Y. M. C. A. building, Omaha; and the Union Station, Washington.

Eck Motors is the title of a booklet published by the Eck Dynamo & Motor Co., Belleville, N. J., printed as a sectional catalogue and data sheet, illustrating and describing the Eck protected type and the Eck enclosed type direct current electric motors. Many detailed views are shown, together with dimensions and price lists. The catalogue is admirably adapted for handy reference and will be much valued by those called upon to estimate or install electric motors of this type.

National Radiator Co., Catalogue C, 1909, is out, being an engineers' and fitters' catalogue and price list of radiators, boilers, tank heaters and specialties made or sold by the National Radiator Co., Johnstown, Pa. The catalogue is 4 x 7 in. and contains 112 pages. The data are conveniently arranged and the catalogue presents an unusually neat and attractive appearance.

Henderson Heaters, for water and steam, the product of the Prizer-Painter Stove & Heater Co., Reading, Pa., are the subject of a handsomely-printed catalogue known as Heater Catalogue No. 7. This well-known line of heaters is presented in newly-prepared photographic views, while stress is laid on the advantages of the twin section form of construction for quick repairs. Some valuable general information regarding the selection of a suitable boiler is given in a section of the catalogue entitled, "Points to Consider." Another section is devoted to Henderson Radiant heaters, which are of the horizontal type and have been produced to meet the demand for a first-class heater which are less costly than the sectional type for small buildings. Under the heading "Chimney Flues" is given some hints regarding the rules for determining flue areas and capacities. Pp. 46. Size 10 x 6 in.

Improved Economy Submergible Bilge Pump and Sewage Ejector, manufactured by Thomas & Smith, 17-19 So. Carpenter street, Chicago, is described in a 12-page catalogue issued by the manufacturers. The device is designed to maintain a dust dry basement or sub-basement where the floor level is below the sewer line. The advantages of the device over the old style bilge pump include a motor protected from dust, moisture, dirt or water. The pump motor, as well as the automatic parts, are placed under a protective hood so that they cannot be tampered with. Several illustrations of the device, together with a detailed description of its points of advantage are contained in the circular.

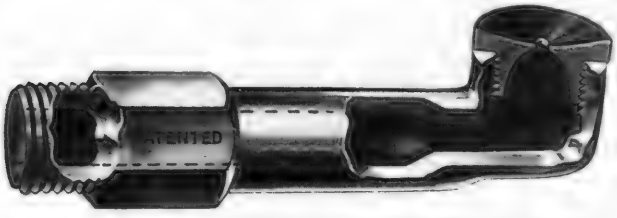
Warren Webster & Co. Bring Suit Against Monash-Younker Co. for Infringement

Warren Webster & Co., Camden, N. J., has brought suit in the Southern District of New York against the Monash-Younker Co., of New York and Chicago, and also in the Middle District of Pennsylvania against a user, for undertaking to sell and install what is known as the Monash "Radifier" valve. An opinion has been secured from Warren Webster & Co.'s counsel to the effect that "this device (the Monash "Radifier" valve) is a direct infringement upon your patent No. 895,265, dated August 4, 1908, and, I advise that suit should be brought both against the manufacturers of this device and against users of it." Warren Webster & Co. announces that it will bring suits against any persons who, notwithstanding its due notice, shall undertake to use this device.

Features of Carrier Air Washer Construction

As a type of modern heating and ventilating apparatus, the air washer occupies a place by itself, both on account of its rapid development and the degree of skill that has been applied, in the comparatively short space of time it has been on the market, to perfecting its operation.

One of the most interesting of these types is the Carrier Standard Air Washer and humidifier. Briefly, it consists of a large chamber, the casing of which is usually built of galvanized iron or copper, and strongly braced with angle irons placed on the outside of the galvanized sheets. These sheets are so arranged that with the soldered edges none of the iron is left unprotected; hence, there can be no rust or corrosion.



SPRAY NOZZLE OF CARRIER AIR WASHER, SHOWING INTERIOR CONSTRUCTION

The air to be humidified is drawn through this chamber and intimately brought in contact with a very finely divided or atomized spray. This spray so completely fills the space that it is impossible for the least particle of dirt to be drawn through without becoming moisture laden.

At the end, where the air leaves the spray chamber, there is placed an eliminator which removes all the free moisture, as well as all of the dirt, which has previously become moisture laden. This is washed down the eliminator plates into the settling tank.

In the spray nozzles used on the Carrier devices the water enters a small circular chamber tangentially, which gives it a whirling or centrifugal action. The outlet or discharge opening is in the axis of rotation, placed at the end of a conical approach. This greatly increases the whirling speed of the water at the point of discharge, and delivers it as a minutely divided or atomized spray, that offers an enormous amount of surface for evaporation.

The construction of this nozzle is such that it is practically impossible to clog it with foreign material, as the smallest opening is 3/32 in. in diameter, while all the water must pass through the two strainers, which are 24 mesh.

The pressure required for the complete atomizing of the water is only 25 lbs. per sq. in.

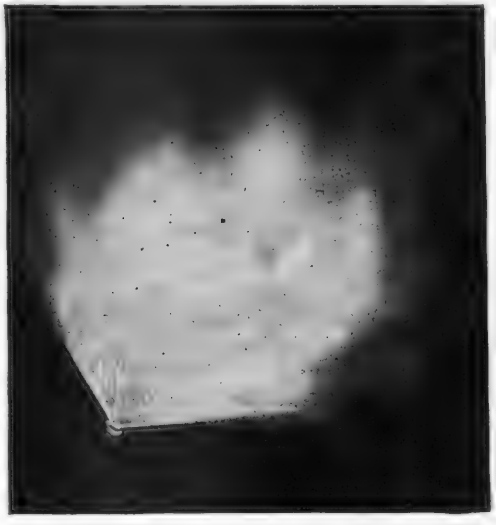
The eliminators are usually built of galvanized iron, but may be of copper, and are made up of a series of plates evenly placed and set in vertical position across the discharge end of the spray chamber.

Each eliminator is made of a single sheet so stamped as to form several corrugations, three of which have projecting lips. The plates are held together with galvanized angles at the tops and bottom and at intervals throughout the height, so as to keep them evenly spaced. All of the rivets and bolts used in their construction are galvanized, so that there is no chance of corrosion.

The action of the eliminator is divided into two portions:

1st—It is entirely covered with a sheet of running water precipitated from the spray laden air and from the flooding sprays (placed just over the eliminators). The air impinges upon the water surface and all solid particles are caught and washed away.

2d—The lip-like projections are designed to prevent the free passage of the water across the surface and form vertical gutters down which the water flows. No trace of free moisture it is said can be found in the air after passing through the eliminators, even with high velocities. The loss in pressure of the air passing through the washer is inappreciable when standard proportions are used.



SPRAY NOZZLE OF CARRIER AIR WASHER IN OPERATION

TRADE AND MISCELLANEOUS NOTES

Coming Events

May 4-7, 1909. Spring meeting of the American Society of Mechanical Engineers, Washington, D. C.

May 5, 6 and 7, 1909. Joint convention of the Southern Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association, at Chattanooga, Tenn. Headquarters at Hotel Patten.

May 10, 1909. First annual meeting of the Federal Furnace League, Atlantic City, N. J., 2 P. M. Headquarters at Marlborough-Blenheim Hotel.

May 11, 1909. Annual meeting, National Association of Manufacturers, New York.

May 12, 13 and 14, 1909. Joint convention of the American Supply and Machinery Manufacturers' Association and the National Supply and Machinery Dealers' Association, at Pittsburg, Pa. Headquarters at the Fort Pitt Hotel.

May 18, 19 and 20, 1909. Annual convention of American Foundrymen's Association, Cincinnati, O. Headquarters, Hotel Sinton.

May 25-27, 1909. Annual meeting, National Fire Protection Society, New York.

June 14-17, 1909. Annual convention of National Association of Master Steam and Hot Water Fitters, Niagara Falls. Headquarters at International Hotel.

June 22, 23 and 24, 1909. Twenty-seventh annual convention of the National Association of Master Plumbers, at Detroit, Mich.

Deaths

Ervin Saunders, vice-president of D. Saunders' Sons, Yonkers, N. Y., manufacturers of pipe threading machinery, died at his home in that city February 17th. He was 60 years old. He had long been in ill health and had not taken active interest in the business in recent years.

John S. Palmer, publisher of Domestic Engineering, of London, died in London March 10th. He was 50 years old. Mr. Palmer was a native of England. He

ENGINEERS AND STEAMFITTERS REQUIRE GOOD TOOLS

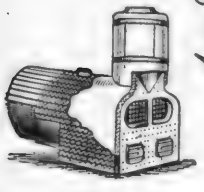
The GENUINE ARMSTRONG Stocks and Dies are

RELIABLE, ACCURATE, EASY WORKING

MANUFACTURED BY

THE ARMSTRONG MFG. CO., 321 Knowlton St., BRIDGEPORT, CONN.

TELEPHONE CALL 6097 FRANKLIN.



ROBERT A. KEASBEY CO.

HEAT AND COLD INSULATING MATERIALS

HEADQUARTERS FOR

85% MAGNESIA, ASBESTOS AND BRINE

PIPE COVERINGS, ASBESTOS PRODUCTS, ETC.

ESTIMATES FURNISHED AND CONTRACTS EXECUTED.

100 NORTH MOORE ST, NEW YORK CITY.

came to the United States at an early age and was for eight years, from 1891 to 1899, connected with the advertising department of Domestic Engineering of Chicago.

Franklyn W. Bruce, founder of the firm of Bruce & Cook, New York, dealers in tin plate, died at his home in Paris, France, March 6th. He was 78 years old. Mr. Bruce organized the present firm in 1855, although the business was originally started in 1812 by John M. Bruce.

Miscellaneous Notes

"Naco," a trade name for plumbing goods, has been adopted by the National Committee of the Confederated Supply Associations for the purpose, as announced in its statement, "of improving the quality of plumbing supplies, and establishing uniform standards of size and quality, with a view to the development of the trade and securing the safety and health of the public generally. The principal object of this association," adds the statement, "is to foster trade and commerce in plumbing and heating supplies, to reform abuses relative thereto, to advance the standard of material and workmanship employed in manufacturing and installing said plumbing and heating supplies, and to prevent so far as possible the sale and use of unsanitary and unserviceable material and the employment of unskilled and inefficient workmanship. On this basis the National Committee invites the assistance and cooperation of all interested parties."

National Association of Jobbers in Wrought Pipe, Valves and Fittings is a new organization formed in Pittsburg March 9th and 10th in consequence of the unsatisfactory conditions arising from the competition among themselves and the practice of direct sales from manufacturers to consumers. Representatives of about 60 jobbing houses were present and the new organization starts with a membership of nearly 100. Following are the officers elected: President, A. E. Ford, Ford & Kendig, Philadelphia; first vice-president, C. H. Simmons, John Simmons Co., New York; second vice-president, O. F. Felix, Pittsburg Supply Co., Pittsburg; treasurer, C. G. Cornell, Cornell & Underhill, New York; executive committee, G. H. Merkel, Merkel Bros., Cincinnati; F. M. Sheldon, Braman, Dow & Co., Boston; E. G. Cuyler, Cuyler & Mohler, Baltimore; William Ivy, N. O. Nelson Co., St. Louis; H. R. Boynton, H. R. Boynton & Co., Los Angeles, Cal. The membership fee has been fixed at $25.00 and the annual dues at $75.00. The annual meeting will be held in March of each year.

Plumbing, Steam and Metal Salesmen's Association of Maine, at its third annual dinner in Portland, Me., March 8, elected the following officers for the ensuing year: President, C. R. Nelson, Magee Furnace Co.; first vice-president, J. Warren Chase, W. L. Blake & Co.; second vice-president, C. S. Mallard, Herrick Co.; third-vice-president, S. R. Mitchell, Walworth Mfg. Co.; secretary-treasurer, W. F. Snow, Dalton-Ingersoll Co.

John Gormly, Philadelphia, former president of the American Society of Heating and Ventilating Engineers, announces his retirement from active business. Mr. Gormly is undergoing a course of treatment for his health.

National Association of Brass Manufacturers, at its annual meeting in St. Louis, March 15, 16 and 17, elected the following officers for the ensuing year: President, Joseph H. Glauber, Cleveland; commissioner, W. M. Webster, Chicago; trustees, A. D. Saunders and E. F. Niedecken, Milwaukee; A. A. Deutsch, Cleveland; A. S. Hill, Haydenville, Mass.; Fred Somerville, Toronto, Ont.

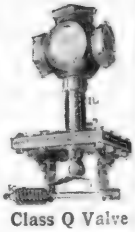
United States Steel Company's report for 1908 shows a decrease in gross sales and earnings of 36 per cent. and a decrease in net earnings of 43 per cent. The net earnings for the year were $91,847,710.57 as against $160,964,673.72 for 1907. The net earnings were greater, however,

Foster Pressure Regulators

"Class Q" or "Class Q H"

For Steam Heating Service NOT exceeding 15 lbs. Delivery

Send for Catalog giving full details of these valves



Class Q Valve

Foster Engineering Co.

117 MONROE STREET **NEWARK, N. J.**

by some $18,000,000 than the previous low record made in 1904.

Building operations for February continue to show an unprecendented increase over those for the same period last year. The increase in the eastern cities is 255 per cent.; middle west, 48 per cent.; southern, 150 per cent.; and Pacific coast, 21 per cent. In New York alone the figures are $22,699,192 against $4,808,627 for February, 1908.

Central Supply Association, at its regular meeting in Chicago, February 23 and 24, discussed the standardization of soil pipe and fittings with a committee representing the American Society of Inspectors of Plumbing and Sanitary Engineers, composed of William G. Williamson, John K. Allen and Edward Quinn. A committee to represent the Central Supply Association for the purpose of further considering the subject was named, consisting of John F. Wolff, William Ivy, G. Schumacher and Charles R. Schmidt. Among the new firms elected to membership was the Cameron-Schroth-Cameron Co., Chicago.

Waukesha, Wis.—Work has commenced on the central heating plant being installed by the Waukesha Gas & Electric Co.

William H. McKiever, New York, announces that he has opened an office in the Everett Building, Union Square North, where he will conduct a general engineering and contracting business for the installation of heating and ventilating apparatus, power plants and other piping work. Mr. McKiever is a member of the American Society of Mechanical Engineers and of the American Society of Heating and Ventilating Engineers.

W. P. Pressinger Co., 1 West 34th street, New York, has been organized by W. P. Pressinger, who recently resigned as general manager of the compressor department of the Chicago Pneumatic Tool Co. The new company will handle the vacuum cleaning machines, both portable and stationary, made by the Keller Mfg. Co., Philadelphia, and formerly sold by the Chicago Pneumatic Tool Co. Local agencies will be established at all distributing points throughout the eastern territory.

Manufacturers' Notes

Pressed Radiator Company of America is the new title of the Pressed Radiator Co., whose headquarters are in Pittsburg. The new organization has been incorporated under the laws of Pennsylvania with an authorized capital of $1,250,000, and will absorb the Pressed Radiator Co., a New Jersey corporation, providing at the same time $500,000 additional

No. 960 SUNRAY BOILER

THE J. L. Mott Iron Works

118 FIFTH AVENUE, NEW YORK

capital. The additional capital is to give the increased manufacturing facilities required by the rapidly expanding business and also to provide for the company's engaging in the manufacture of boilers and heating specialties. Besides its own offices in Pittsburg, New York and Chicago, and 25 agencies in the principal cities of the United States, the Pressed Radiator Company of America has its own offices in London and Paris and agencies in Hamburg, Brussels, St. Petersburg and Yokohama. As is well known, pressed radiators possess advantages in the way of reduced weight, reduced space occupied, facility of handling, over the usual forms of radiation.

H. W. Johns-Manville Co., New York, has taken over the United Indurated Fibre Co., manufacturer of water closet seats and tanks of indurated fibre.

New York Blower Co., Chicago, has appointed Harold McGeorge as its agent in Ohio and Western Pennsylvania, with headquarters at 1718 Williamson Building, Cleveland.

American Radiator Company's report for the year ending January 31, 1909, shows net profits of $901,254 compared with $899,724 in the preceding year, and an amount equal to 13.83 per cent. earned on the $5,000,000 common stock, compared with 13.79 per cent. in the previous year. In a statement to the stockholders, President Woolley says:

"The volume of business and the net profits were greater than the preceding year. Building operations throughout the country at the beginning of the year 1908 were temporarily obstructed by the financial conditions which then prevailed. As the year progressed, however, there was a resumption of activity in the building trades.

"The total permits issued for the construction of new buildings in the principal cities of the country in 1908 were 3 per cent. in excess of those in 1907. The lower selling prices we were enabled to establish because of the reduction in the cost of raw materials induced a vast number of people to purchase our products for introduction in old buildings, and the business from that source was largely increased. This was an important feature in the year's work.

"Increasing the volume of business, we have been able to reduce the margin of profit. This proves an influential factor in increasing the field of demand. The employment of publicity and advertising methods has impressed property owners and broadened the demand for our products. The company's organization for distribution of its products through its twenty-one branches never reached so high a plane of effectiveness as during the year which has just closed.

"Steady progress has also been made in methods of manufacture and in improving the physical condition of the company's producing properties. The volume of the company's producing capacity is conservatively in excess of the demand which has thus far been created, affording an abundant opportunity to maintain progressive selling policies. The margin of profit as related to the volume of sales is prudently small and renders necessary the practice of intelligent economies in the conduct of the business in every department. The application of this principle is an enduring business foundation."

CENTRAL STATION AND INDUSTRIAL HEATING PLANTS
THE SCHOTT SYSTEMS

INDESTRUCTIBLE

UNDERGROUND CONDUIT AND INSULATION. GREATEST CAPACITY, EFFICIENCY AND HIGHEST CLASS OF CONSTRUCTION ARE THE DISTINCTIVE FEATURES THAT MAKE

THE SCHOTT SYSTEMS

THE BEST IN THE WORLD

W. H. SCHOTT, ENGINEER CHICAGO

"THE POTTER" MESH SEPARATOR

OR BOILER DRY-PIPE

DRY STEAM—SAFETY—ECONOMY

POTTER SEPARATOR CO., Newburgh, N.Y. N.Y. OFFICE: 39 Cortlandt St.

Central Foundry Company's annual report, covering the operation of its plants during the period of 18 months ending December 31, 1908, shows a net income of $474,678.21. Against this charges are made of $133,259.07 for maintenance of plants and equipment, including replacements, and of $347,670 for interest paid and accrued, amounting in all to $480,929.07, showing a deficit for the 18 months of $115,540.76. President August Heckscher, in his report, states:

"The 18 months under review have been the most difficult and trying in the company's experience. The stocks of pig iron at hand and the current contracts for nearby deliveries were at the time of the last annual report at a very high cost, on account of congestion of traffic and shortage of iron, rather larger in quantity than usual, which iron had to be consumed and has since been replaced by iron at very much lower prices, entailing a large depreciation in inventories. The same thing was true of the inventories of finished goods which were necessarily made up out of high priced iron and with an unusually high labor cost, due to the then prevailing activity in all lines of manufacture. These high priced goods have since been disposed of and have been replaced by goods made from low priced iron, with a considerably reduced cost of manufacture.

"Our sales in all lines have shown a healthy improvement over last year, and although prices are extremely low, with the plants well located and their equipment renewed and improved, starting as we do from such a low level of prices, the future certainly looks brighter than we have been able to forecast at any time in the past."

Williamsport Radiator Co., Williamsport, Pa., has opened a salesroom for the display of boilers and radiators at 99 Beekman street, New York. Fred J. Lennox, manager of the eastern territory, is in charge, with L. P. Grant as his assistant.

A. Wyckoff & Son Co., Elmira, N. Y., has taken over the business of the Wyckoff Wood Pipe Co., manufacturer of asphaltum pitch coated wood pipe for insulating and for pipe conduits. A. Wyckoff & Son Co. will hereafter be located at the Home street factory, which will be doubled in capacity. The old plant on Chemung street will be abandoned. The capital stock of the company has been increased to $100,000.

Garner Ventilating Co., Chicago, Ill., has increased its capital stock from $10,000 to $50,000.

L. J. Wing Mfg. Co., 90 West street, New York, announces an increase of its capital stock from $25,000 to $100,000 to take care of its growth in the business. The company has taken larger quarters at the same address and reports large sales of the Wing "Typhoon" turbine blower for induced furnace draft work.

New Incorporations

Jarvies Gas Burner, Plumbing & Heating Co., Kansas City, Mo. Capital stock, $50,000. Incorporators: Thomas Jarvies, Hannah Jarvies and Elmer Lutz.

Dakota Plumbing & Heating Co., capital $10,000, to conduct a heating and plumbing contracting business.

Orleans Plumbing Co., New Orleans, La. Capital stock, $50,000.

Ozone Pure Airfier Co., Chicago, to manufacture air purifying and ventilating apparatus. Incorporators: William Stahl, P. J. McMillan, Gustav Staats and Gann & Peaks, 181 La Salle street, Chicago.

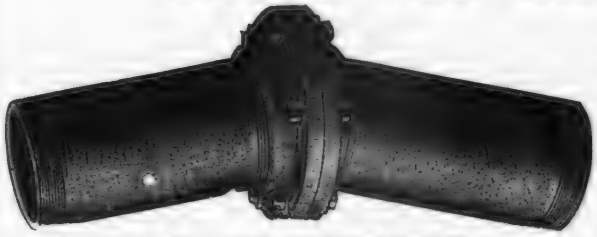
Henry B. Pancoast Co., Philadelphia, incorporated to manufacture and deal in piping, castings, steam fitting and plumbers' supplies. Incorporators: Henry B. Pancoast, Morris G. Belknap and J. G. Gray.

Continental Heater & Radiator Co., Richmond, Va. Ruben Burton, president. Capital stock, $300,000.

Municipal Plumbing Co., New Orleans, La. Capital stock, $25,000. Incorporators: H. J. Roberts, Walter Albrecht and Edward V. De Hart.

Freed Heater Co., Collegeville, Pa., capital $50,000, to succeed the Steam Fit-

"CROOKED WORK MADE EASY"



Slotted Angle Flanges will make any angle up to and including ten degrees. Any angle up to the maximum can be made simply by shifting the two flanges to the desired position. The slot in the bolt circle gives bolt hole for any position, and after adjusting to the desired angle fitting is made up in usual manner.

Method of Making Angle with Slotted Angle Flange.

AMERICAN DISTRICT STEAM CO.

Lockport, N. Y. N. Tonawanda, N. Y. Chicago

ters' Heater Co., and to manufacture and deal in heating supplies. President, A. C. Freed; treasurer, H. E. Campbell; secretary, J. H. Freed; sales manager, M. A. Campbell, formerly of the Philadelphia Branch, American Radiator Co.

F. C. Welch Plumbing Co., Clarksburg, Va. Capital stock, $25 000. Incorporators: Frank C. Welch, Glenn B. Waters, Sarah J. Welch and others.

Eureka Heating Co., Brooklyn, N. Y., capital $5,000. Incorporators: J. A. Cook, Jr., Emily L. Cook and N. T. Hall, of Brooklyn.

In the Natural Gas Field

New Orleans, La.—An ordinance is before the city council which, if adopted, will grant the privilege to the Busch-Walker-Everett syndicate for the purpose of distributing and vending natural gas in the city of New Orleans for a period of 50 years at a rate not to exceed 50 cents per 1,000 cu. ft. to ordinary consumers and 20 cents per cu. ft. to manufactories.

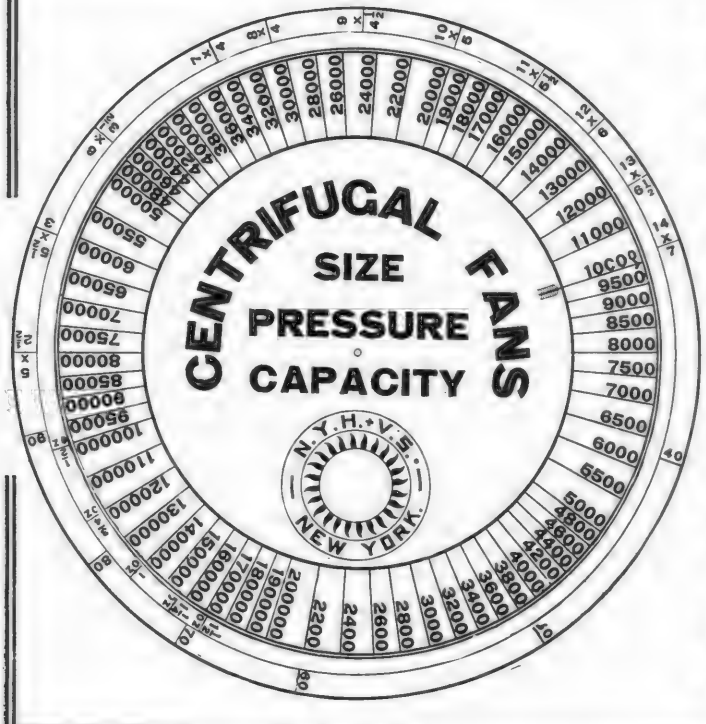
The syndicate asking for this franchise proposes to pipe its gas supply from the Caddo, La., fields, said to be the greatest in the world. It is also said that the source of supply is in this case at a greater distance from the consumer than is the case anywhere else. In case the franchise is granted, it is proposed to have the Caddo Gas Company parallel the Southern Pacific with its pipe lines on its way to New Orleans so that every town along the railroad from Alexandria to New Orleans will be afforded the opportunity of using natural gas.

Some opposition to the proposed franchise has been expressed on the ground that the rates are too high and that not sufficient opportunity has been given for competition in the matter of securing the franchise. The city, however, is at present paying a rate of $1.15 and $1.40 per 1,000 cu. ft.

Hamilton, O.—The pipe line from the West Virginia field to Covington, Ky., and Cincinnati is nearing completion. The dates for the opening of the two systems is fixed at June 1. A movement is on foot to lay a pipe line between Cincinnati and Hamilton, to carry natural gas to Hamilton. A representative of the Columbia Gas & Electric Co. has already made the survey.

Waurika, Okla.—Waurika is to have natural gas, the city council having called a special election for the purpose of voting on the proposition of granting a franchise to develop this field for both oil and gas, with the understanding that in case they do not find oil or gas here it will be piped from Petrolia, Tex.

Wheeling, W. Va.—The price of natural gas for fuel in this city will be ad-



WE WILL SEND YOU ONE OF THESE CENTRIFUGAL FAN SLIDE RULES FREE

Send us the names of five (5) heating and ventilating draughtsmen together with a 2-cent stamp for postage, and you will receive, by return mail, one of these slide rules, printed on stiff check paper, and containing full directions on the back for using same.

Address

N. Y. HEATING AND VENTILATION SCHOOL
Box 62, Madison Square
NEW YORK

vanced from 23 cents per 1,000 cu. ft. to 25 cents. This is one of the features of a contract entered into by the city council with the Natural Gas Co. and is based upon the assumption that the supply of natural gas is constantly decreasing.

Covington, Ky.—An ordinance, passed by the Covington, Ky., city council grants a franchise to the Union Light, Heat & Power Co. to supply Covington with natural gas by June 1. If the natural gas should begin to give out and the supply prove not sufficient for both Covington and Cincinnati, which is also to be supplied, Covington will get the preference. If the natural gas ever gives out and the company manufactures gas in the West Virginia coal fields it owns, this gas is to be considered for all purposes natural gas and to cost 30 cents. Under the terms of the contract, residents who live on streets where there are mains at present are to get gas at 30 cents per 1,000 cu. ft. by June 1. Others are to get it by July 1. If at any time Cincinnati gets gas at a lower rate than 30 cents, Covington is to enjoy the reduced rate. The company which is to supply the gas to Cincinnati and Covington owns over half a million acres of fine coal lands in West Virginia.

F. H. Olliphant, of Pennsylvania, mining engineer of the Pennsylvania Coal Gas Company, geologist of the Standard Oil Company, and who has prepared all the United States government reports on natural gas since 1896, and is a recognized American authority on this subject, declares that 20,000 cu. ft. of natural gas will, for fuel purposes, equal one ton of coal. Therefore, natural gas at fifty cents per 1,000 cu. ft. would be equivalent to coal at $10 a ton. Even at 20 cents it makes the gas equivalent to coal at $4 per ton.

New Firms and Business Changes

Sawyer & Dean, Ipswich, Mass., have dissolved their partnership. The firm will be continued by Frank H. Sawyer at the same location on Locust street.

Gibby Heating Co., Buffalo, N. Y., a new steam and hot water heating concern, has located at 217 Franklin street. It is composed of Joseph D. Gibby, A. Vossler and Charles Gibby.

Evans Plumbing & Heating Co., Freeport, Ill., has increased its capital stock from $8,000 to $12,000.

Crane Co., Chicago, it is stated, has completed negotiations to purchase the property of Knight & Jillson, Indianapolis, Ind., wholesale dealers in steam, water and gas supplies. The Knight & Jillson Company is one of the oldest firms in Indianapolis. It has been in the present location at 123-133 South Pennsylvania street for thirty-five years. From an humble beginning, "about $6,000 worth of junk, no credit, nothing but a favorable acquaintance and a knowledge of the business," the firm has grown to its present proportions, where it is estimated the value of building and stock will be more than half a million dollars. A close business relation has existed between Knight & Jillson and Crane & Co. for many years.

Springfield Heating & Ventilating Co., Springfield, O., manufacturer of hot air furnaces, gas burners, etc., will remove its plant to Columbus, where it will occupy the building at Front and Maple streets. Samuel Fippen, of Columbus, has been elected president of the company and R. S. Thompson will be general superintendent. The name of the company has been changed to the Ideal Heating Company and considerable Columbus capital has been invested in the concern, which is capitalized at $10,000.

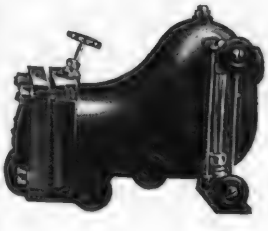
C. H. Brown Plumbing Co., Seattle, Wash., has removed to larger quarters at 223 Pine street.

Business Troubles

German-Russell Co., Cincinnati, O., has failed with assets of $30 000 and liabilities of $22,000. A. W. Fuhrmann was named receiver.

McDaniel Improved Steam Trap

WILL DO THE WORK



When you need a Steam Trap buy one you know will work. With a McDANIEL we take all the chances. Don't pay until you are satisfied. We have been 25 years manufacturing Steam Traps and know there is no better trap made. May we send you one for trial?

Watson & McDaniel Co.

160 North 7th Street - PHILADELPHIA, PA.

Send for Catalogue

Andrews & Johnson, Chicago, have placed their affairs in the hands of a trustee, James McAlear, 1209 Fisher Building, having been named for that office. The assets are placed at $31,000 and liabilities at $40,734.36.

Contracts Awarded

Thos. Breen Co., Utica, N. Y., steam heating and ventilating school building No. 20 in Utica.

Scott Co., Oelwein, Ia., heating and plumbing new city hall and jail for $15,000.

Fred Brewer, Richland Center, Wis., heating court house, jail and county farm for $2,995.

John G. Sutton Co., San Francisco, Cal., heating and ventilating Grammar School Building on Twelfth street for $13,343.

H. F. Hogan, Sioux City, Ia., steam pipes, fittings and radiators for the Auditorium building. It is understood the company will arrange with the Sioux City Service Co. for the heating of the building.

Wells & Newton Co., New York, steam heating and plumbing two office buildings at Salt Lake City for $100,000.

Walker & Chambers, New York, heating and ventilating building at Fifth avenue and 47th street.

Dean & Haven, Olean, N. Y., heating and plumbing county jail at Youngstown, O., for $40,000.

T. T. Eason, Marlow, Okla., heating new high school building at Marlow for $3,750.

Cronan's Eagle Cornice Works, San Francisco, Cal., heating and ventilating Madison Primary School building for $13,488.

Walworth Mfg. Co., Boston, heating United States fortresses at New London for $20,912.

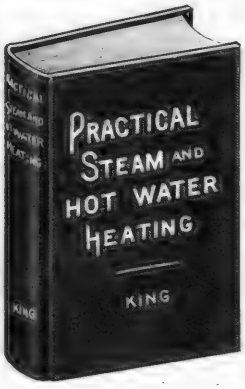
Baker, Smith & Co., New York, heating Carnegie Library building in Homewood, Pittsburg, for $8,000.

THE TORRIDOOR HEATING SYSTEMS

Are Incomparably the Best for Health, Comfort and Economy
They Combine all Advantages of Other Systems
Are Simple, Efficient and Satisfactory

For Full Particulars Address

THE TORRIDOOR POWER, LIGHT AND HEATING CO. OF AMERICA : Home Office, EAST ORANGE, N. J.



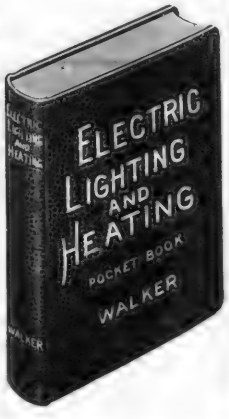
Practical Steam and Hot Water Heating and Ventilation

By ALFRED G. KING

367 pages. Containing over 300 detailed illustrations. An original and exhaustive treatise for the use of all engaged in the business of steam and hot water heating and ventilation. **PRICE, $3.00**

Electric Lighting and Heating

By SYDNEY F. WALKER, M.I.E.E.



438 pages. 300 engravings. Bound in leather, pocket book form, gilt edges. Comprising useful formulas, tables, data and particulars of apparatus and appliances for the use of Central Station Engineers, Contracting Engineers, Engineers in charge of power plants, Electricians, etc.

PRICE, $3.00

Address,

The Heating and Ventilating Magazine 1123 BROADWAY NEW YORK

S. M. Dick Plumbing & Heating Co., Brushton, Pittsburg, heating and plumbing $75,000 school building in Pittsburg for $6,000. Also heating and plumbing storage building at Cora and Tioga streets.

Albert B. Franklin, Boston, heating and plumbing new addition to the high school for $6,960.

Lennig-Rapple Co., San Francisco, Cal., heating new six-story building which Crane Co. is building at First and Howard streets. The contract amounts to $12,000.

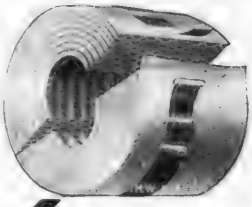
Virginia Plumbing & Heating Co., Richmond, Va., steam heating and plumbing seven-story apartment house at Salisbury, N. C., for $8,000; also steam heating and plumbing Miller-Rhodes department store in Richmond for $3,000, and vacuum heating city auditorium in Richmond for $6,000.

Business Chances

Colorado Springs, Colo. — Improvements aggregating more than $500,000 are being planned by the Modern Woodmen of America at the national sanitarium north of this city. This will include the erection of a central administration building, library, amusement hall and a refrigerating and heating plant.

Washington, D. C.—Sealed proposals will be received at the office of the Su-

Is Pipe Covering a Part of Your Business?



If Not, Why?

Our special proposition is a great success. Heating Contractors all over the country are making money by following our suggestions.

Write to-day for Free Samples, Booklet and our Special Proposition

H. W. JOHNS-MANVILLE CO.

Manufacturers of

Asbestos and Magnesia Products, Asbestos Roofings, Packings, Electrical Supplies, Etc.

Baltimore	Cleveland	New Orleans
Boston	Dallas	New York
Buffalo	Detroit	Philadelphia
Chicago	Kansas City	Pittsburg
	London	San Francisco
	Los Angeles	Seattle
	Milwaukee	St. Louis
	Minneapolis	

(983)

The Webster Air Washer

WE cannot repeat too often these points about the Webster Air Washer:

The eliminator baffles are HORIZONTAL in form; self-cleaning.

The spray device is non-cloggable; no openings less than 7-32-inch diameter.

98 per cent. efficiency is guaranteed in the removal of dust and dirt and 100 per cent. in the removal of free moisture.

It is built substantially, of galvanized iron or heavy copper, with many refinements in detail which make it neat, attractive and efficient in operation.

The name WEBSTER on an air washer means that the guarantees are backed by this company, with a reputation and standing known all over the country by thousands of those engaged in heating and ventilation. Further, it means the advantages of an organization established for 21 years, with branches in all the principal cities co-operating with the heating engineer or contractor.

Booklet 17-A tells more about it and will be sent free upon request.

WARREN WEBSTER & CO., Camden, N. J.

Air Cleansing **Air Cooling** **Automatic Humidity Control**

ESTABLISHED 1888 BRANCHES IN THE PRINCIPAL CITIES

pervising Architect, Treasury Department, for the following-named work:

Until April 20, 1909, for the construction complete of the U. S. Post Office at Kearney, Neb.

Until April 21, 1909, for the construction complete (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post Office at Manistee, Mich.

Until April 22, 1909, for the construction (including plumbing, gas piping, heating apparatus, electric wiring and conduits of the U. S. Post Office at Willimantic, Conn.

Until April 26, 1909, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post Office at Barre, Vt.

Until April 28, 1909, for the construction complete of the U. S. Post Office at Kewanee, Ill.

Until May 1, 1909, for the construction (including plumbing, gas piping, heating apparatus, electric conduits and wiring) of the U. S. Post Office at Michigan City, Ind.

Until May 2, 1909, for the construction complete of the U. S. Post Office and Court House at Lake Charles, La.

Wanted

Engineer, experienced in designing and erecting heating systems of all classes, desires position with some high-class contracting firm. Highest references. Address L, care of HEATING AND VENTILATING MAGAZINE.

Wanted, young man calling on stationary engineers to handle side line. A proposition of permanent value to operating engineers of heating and ventilating plants. Address R, care of HEATING AND VENTILATING MAGAZINE.

Wanted, man calling on users of draughting materials to handle side line of value to all draughtsmen in offices of mechanical engineers and architects. Address T, care of HEATING AND VENTILATING MAGAZINE.

Books on Heating and Ventilation

Johnson's Handy Manual for Plumbers and Steam Fitters. By John J. Johnson. 202 pages, 69 illustrations. The manual gives in detail methods of installing steam and hot water heating plants and improved sanitary plumbing. Price $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

The Principles of Heating. By William G. Snow. A practical and comprehensive treatise on Applied Theory in Heating. 161 pages. 42 illustrations. 38 tables. Size, 6x9 in. Cloth, $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.60.

Heating and Ventilation. By. C. L. Hubbard. A practical manual of hot air, steam and hot water heating, and modern systems of Ventilation. 256 pages. 180 illustrations. 6½x9¾ in. Cloth, $1.50; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.00.

Data for Heating and Ventilating. By William J. Baldwin. Price, 50c.; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.25.

An Outline of Warming and Ventilating. By William J. Baldwin. Price, $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

The Ventilation of the Schoolroom. By William J. Baldwin. Price, $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

House Heating by Steam and Water. By Chas. B. Thompson. Giving methods of installing heating apparatus in the home, rules for computing radiation and heat loss, charts showing boiler power and coal consumption. 265 pages. 268 illustrations. 7¼x10¾ in. Cloth, $3.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $3.60.

Steam and Hot-Water Fitters' Text-Book. By Thos. E. McNeill. $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

Contract and Estimate Record Book for Steam and Hot Water Heating. By B. H. Jessup. 200 pages. Arranged for 100 estimates. 7x12 in. Cloth, $1.50; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.00.

Steam and Hot Water Heating Charts. By A. G. King. 10 large blue prints of steam and hot water piping, radiator and coil connections, etc. Each size, 18x22 in. Price, $5.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $5.25.

Centrifugal Fans. By J. H. Kinealy. A theoretical and practical treatise on fans for moving air in large quantities at comparatively low pressures. 206 pages. 39 diagrams. Full limp leather pocketbook, round corners, gilt edges. Price, $5.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $5.25.

Heating by Hot Water, Ventilation and Hot Water Supply. By Walter Jones. With instruction and suggestions on the best methods of heating public, private and horticultural buildings by the high pressure and low pressure systems. With 143 figures and engravings, including folding plates; third edition; 8vo.; cloth; illustrated; 344 pages. Price, $3.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $3.50.

Tables for Calculating Sizes of Steam Pipes. By Isaac Chaimovitsch. A manual for the determination of steam pipe sizes for low pressure heating. 48 pages. 4 insert tables. Price, $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.50.

ADDRESS
The HEATING and VENTILATING MAGAZINE 1123 Broadway NEW YORK

BOOKS ON HEATING AND VENTILATION

Heating and Ventilating Buildings, a standard manual for heating engineers and architects. By Prof. R. C. Carpenter. Fourth edition, largely rewritten. 577 pages. 277 Ills., 8vo, cloth. $4.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $4.25.

Baldwin on Heating; or Steam Heating for Buildings. By William J. Baldwin. Fifteenth edition. Revised and enlarged. 391 pages. 131 figures. Size, 5x7½ in. Contains descriptions of steam heating apparatus for warming and ventilating large buildings and private houses, with remarks and tables. Cloth, $2.50, or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $3.25.

Questions and Answers on the Practice and Theory of Steam and Hot-Water Heating. By R. M. Starbuck. Illustrated. $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

Mechanics of Ventilation. By Geo. W. Rafter. 50c.; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.25.

Modern Sanitary Plumbing, Steam and Hot Water. By James J. Lawler. 400 pages. 228 illustrations. Size, 6x9 in. This is the latest edition of Mr. Lawler's well-known work on this subject. Price, $5.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $5.25.

Notes on Heating and Ventilation. By John R Allen. 152 pages. 34 illustrations. Size, 4½x6½ in. One of the new books, brought quite up to date, and containing much information to guide the intelligent steam fitter in the installation and heating and ventilating apparatus. Cloth, $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.50.

Ventilation of Buildings. By William G. Snow and Thomas Nolan. 83 pages. Pocket size. Contains a statement of the general principles of ventilation and of their application to different kinds of buildings. Boards, 50c.; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.25.

Steam Heating and Ventilation. By Wm. S. Monroe. Containing formulas and data valuable in the designing of heating and ventilating plants. Price, $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.60.

Air-Conditioning. By G. B. Wilson. Being a short treatise on the humidification, ventilation, cooling and the hygiene of textile factories—especially with relation to those in the U. S. A. With figures. 12mo. Illustrated. 143 pages. Price, $1.20; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.00.

Steam-Electric Power Plants. By Frank Koester. A practical treatise on the design of Central Light and Power Stations and their economical construction and operation. 473 pages. 340 ills. Price, $5.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $5.25.

Dimensions of Pipe, Fittings and Valves. By W. D. Browning. Compiled and arranged for engineers, architects and draughtsmen. Also containing some information on steam heating, bathroom fixtures, etc., etc. Flexible cloth. Price, 50c.; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1 25.

Light, Heat and Power in Buildings. By Alton D. Adams, M. E. The purpose of this volume is to present in compact form the main facts on which selection of the sources of light, heat and power in buildings should be based. The problem is to determine the kind of equipment that will yield the service required at the least cost. 12mo. Cloth, $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

A Manual of Heating and Ventilation, for engineers and architects, embracing tables and formulas for dimensions of pipes for steam and hot-water boilers, flues, etc. By F. Schumann. Second edition, revised and enlarged. 12mo, $1.50; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.00.

German Formulas and Tables for Heating and Ventilating Work, especially adapted for those who plan or erect heating apparatus. By Prof. J. H. Kinealy. Illustrated. Price, $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

Health and Comfort in House Building, or Ventilation with Warm Air. By J. Drysdale and J. W. Haywood. 8vo., cloth. Price, $3.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $3.50.

Quick Rules for Heating and Ventilating. By W. J. Baldwin, Jr. Price, $1.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $1.75.

The School House. Its Heating and Ventilation. By J. A. Moore. 204 pages, illustrated. $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.60.

Ventilation in American Dwellings. By Dr. D. B. Reid. 12mo, 124 pages, 100 illustrations, cloth, $1.50; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.25.

Heat for Engineers.—A treatise on heat with special regard to its practical applications. By Chas. R. Darling, Lecturer in Heat at Finsbury (England) Technical College. Tables, index, 442 pages, 110 illustrations, 8vo, cloth. Price, $5.00; or, the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $5.25.

Dean's System of Greenhouse Heating, by steam or hot water, with formulas for obtaining different temperatures, by Mark Dean. Price, $2.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $2.50.

Steam Fitters' Computation and Price Book, abridged. By Mark Dean. Price, $2.50; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $3.25.

Practical Treatise Upon Steam Heating. By F. Dye. Embracing methods and appliances for warming buildings, etc. Low pressure, high pressure and exhaust steam. 8vo, cloth, illustrated. Price, $4.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $4.50.

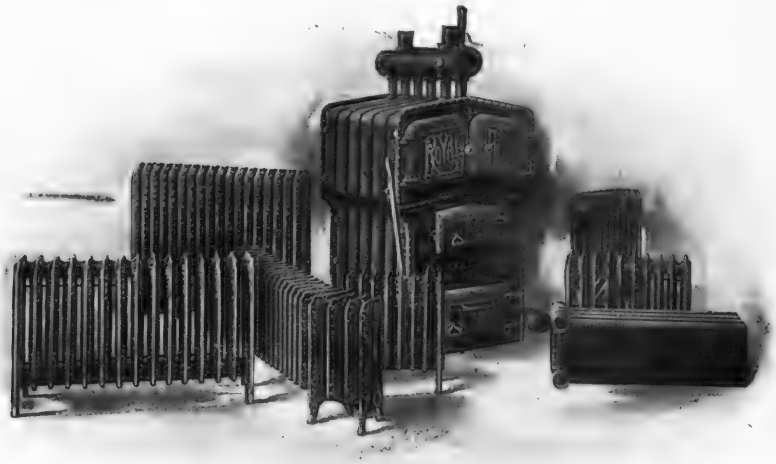
The Heating of Large Buildings. By A. R. Wolff. Illustrated. 8vo, paper. New York, 1893. 25c. Sent, postpaid for one new subscription to THE HEATING AND VENTILATING MAGAZINE.

Hot-Water Heating and Fitting. By W. J. Baldwin. Fourth edition. Price, $4.00; or the book and one year's subscription to THE HEATING AND VENTILATING MAGAZINE, $4.50.

Address

HEATING AND VENTILATING MAGAZINE

1123 BROADWAY, NEW YORK



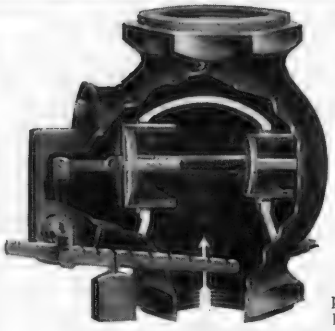
Let us send you a few copies of "Heating and Ventilating the American Home"—an article in booklet form. You can distribute hese to advantage among prospective homebuilders in your town.

HART & CROUSE CO.

Home Office: Utica, N. Y.

BRANCHES:

New York, 41st St. and Park Ave.
Chicago, 80 Lake St.
Dallas, 659 Elm St.
Columbus, Poplar and Henry Sts.
Minneapolis, Exchange. 742 Lumber



THE DAVIS NOISELESS BACK PRESSURE VALVE

Semi Balanced Disc

Made in sizes from 2 to 30 inches

This valve is designed to maintain any given back pressure of exhaust steam for heating, drying or other purposes.

It is a distinct improvement on the old style single seated valve, the many objectionable features of which are entirely eliminated. It has a piston type of inner valve with discs of different area. One disc therefore partially balances the other and enables the valve to maintain any back pressure by the use of a comparatively small counter-weight.

It operates noiselessly and cannot possibly injure the seats by pounding. The action of the inner valve is similar to the movement of a piston in a cylinder; it simply slides on the seat when opening or closing and rests against a spring plate when closed. The construction of the inner valve and seats is of such a nature that uneven expansion of the metals will not cause the valve to stick or bind, a patented feature which places this valve in a class by itself.

It may be placed in a horizontal position with the cover on the top, bottom, or side or in a vertical position. When used on vacuum systems the discs may be bevel seated and ground to a tight fit if desired.

Our general catalog of valve specialties will be sent upon request

G. M. DAVIS REGULATOR CO.

151 Milwaukee Ave., Chicago

Manufacturers of **Davis Pressure Regulators, Exhaust Relief Valves, Stop and Check Valves, Steam Traps, Pump Governors and Other Specialties**

For Heating Apartment Houses, Public Buildings, School Houses, Churches and Large Residences always use the

AMERICAN FOR STEAM

—OR—

ADVANCE FOR WATER

These Boilers are cast iron sectional boilers of Header Construction, made in five styles of forty sizes, with capacities of 350 to 7,200 feet for Steam, and 575 to 11,875 feet for Water.

Our American Blue Book gives all measurements, capacities and list prices, and tells of the advantages of this Header Construction and the other good points of these boilers.

THE BLUE BOOK IS FREE—ASK FOR IT

PIERCE, BUTLER & PIERCE MFG. CO.

DEPT. R **SYRACUSE, N. Y.**

Established Reputation

The quick-selling value of an article depends upon its reputation as a well-advertised product. With IDEAL Boilers and AMERICAN Radiators, the merit of the goods is convincingly brought before the houseowner through widely circulated daily, weekly and monthly periodicals.

IDEAL-AMERICAN outfits are known in cottages, and mansions, and every class of residence or building, large and small.

The dealer handling IDEAL Boilers and AMERICAN Radiators finds a large percentage of his customers thoroughly informed as to the merits of these goods, and ready to buy as soon as they can be advised of their specific needs. Established IDEAL - AMERICAN reputation means established trade for the dealer.

AMERICAN RADIATORS & IDEAL BOILERS

AMERICAN RADIATOR COMPANY

General Offices: 282-284 Michigan Ave., Chicago

New York, Boston, Philadelphia, Chicago, Pittsburg, Cincinnati, Atlanta, Milwaukee, Buffalo, Indianapolis, Detroit, St. Louis, Omaha, Kansas City, Minneapolis, Denver, San Francisco, Cleveland, Seattle, London, Paris, Berlin